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A THERAPEUTIC GUIDE

TO

Alkaloidal–Dosimetric–Medication

(SECOND EDITION)

By JOHN M. SHALLER, M. D.

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PREFACE.

The following pages are offered to students and practitioners of medicine simply as a guide to the practice of "Dosimetry," or Alkaloidal Medication. The book does not contain a complete, scientific exposition of the physiological actions of the active principles of all plants, upon men and animals. Only such prominent physiological effects are described as will enable practitioners to prescribe them intelligently. Attention is particularly given to the application of remedies in the treatment of the sick.

Since the literature on the subject of these remedies is still meager in amount, the writer has been obliged to draw chiefly from his personal experience. The dosage for children, especially in the case of aconitine, has been particularly difficult to ascertain and, only after prolonged experimentation, not unaccompanied with considerable anxiety, has a safe and efficient dose been determined upon.

The text contains the subject-matter of two courses of lectures on "The Uses of Dosimet-

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ric Medicines," delivered in connection with lectures on Clinical Medicine to the students of the Cincinnati College of Medicine and Surgery."

The thirty-odd remedies, an account of which formed the basis of these lectures, are considered the most important in general use, and are usually sufficient to enable a general practitioner to treat successfully such cases as present themselves to him.

The writer does not, however, wish to convey the idea that the list of alkaloidal granules contains all the medicines prescribed by dosimetric physicians. There are a great many excellent medicines which cannot be prepared in granules or even in tablets, and there are others, prepared in this way, which cannot produce any effect whatever when given in such doses as these granules contain. This much, however, is certain, that the more important remedies are prepared in granule form, and that the majority of diseases are treated more successfully by giving small and frequently repeated doses of active principles, than by giving cruder preparations in large doses at long intervals of time.

Not all the medicines used in dosimetry are alkaloids. Among them are found resinoids, glucosides, acids, salts of various metals, extracts and various chemical combinations and other substances which cannot be classed with the above, as pepsin, diastase, iodoform, nitroglycerin (glonoin), camphor monobromate, etc.

If a perusual of the following pages shall enable medical practitioners to apply the active principles of plants, successfully, for the alleviation and cure of disease, the object for which they have been written will have been accomplished. In recasting the lectures into the present form, frequent recourse was had to the works of Burggræve, Castro, Bartholow, H. C. Wood, Potter and Waugh, and to "The National Dispensatory," Sajous, "Annals of Universal Medical Sciences," and to the "Reference Handbook of Medical Sciences."

DEDICATION.

I dedicate this book to my wife, whose assistance and advice have always been valuable to me.

THE AUTHOR.

PUBLISHER'S STATEMENT.

It has given me great pleasure to put Professor Shaller's manuscript into shape for this book and I desire to thank him for selecting me as publisher, in which capacity I have gone carefully over all the matter herein contained and most heartily recommend it to the honest seeker after knowledge along alkaloidal lines. I believe that this book, from a practical American physician to the American profession, will be an important stepping stone to the inevitable adoption of the active principle as the basis of scientific medication.

W. C. Abbott, M. D.

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Station X, Chicago.

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INTRODUCTION.

About fifty years ago, Professor Adolph Burggræve, of the University of Ghent, conceived the idea of administering in disease, according to certain simple rules, the active principles of plants prepared in granules.

Because the medicines were "mathematically measured" in small doses, the name "Dosimetry" was applied to distinguish this method of prescribing from others then in vogue.

It is not claimed that dosimetry is a new system or that it is a complete practice. The active principles of plants, which have been used for ages in cruder form, are prepared in granules. This is done for the purpose of convenient dispensing and of assuring accurate dosage. That granules contain accurate doses is evidenced by the fact that uniform results are always obtained, and fatal effects have never been observed.

One of the precepts of dosimetry, or alkaloidal medication, is: "*To acute diseases oppose acute treatment, to chronic diseases chronic treatment.*" —Burggræve.

These granules represent a minimum adult dose and, in acute diseases, they may be administered every fifteen minutes, every half hour or every hour, according to the severity of the attack, until some improvement is manifested. The medicine should then be given at greater intervals. By pursuing this method closely it is simply impossible to overdose the patient. On this account the use of the alkaloids and other active principles and powerful drugs are perfectly free from danger. To insure better absorption of the granules, treatment is usually begun by giving a dose of seidlitz salt to clear and freshen the alimentary canal.

In cases in which the mucous membrane of the mouth is very dry, indicating that stomach solution will be slow, it is best to prepare a solution of the granules in water. Combinations may be made with different granules without the fear of chemical incompatibility except in the case of tannin. This granule should never be given with any alkaloid, as it forms an insoluble tannate.

Another advantage of the alkaloidal method is that in acute diseases active treatment is begun immediately, even before a positive diagnosis can be made. This is done with the hope of checking the progress of the impending disease and of aborting fever.

Physicians who have tried this method testify to its wonderful efficacy in jugulating many acute febrile diseases, a thing comparatively easy to do at the beginning of the attack. The medicines used for this purpose, are aconitine, digitalin and veratrine.

There is no recognized dose, for no one can possibly say how much of a given remedy will be required to relieve a symptom, therefore minimum doses should always be given and repeated frequently until the desired effect is obtained. Those physicians who use alkaloidal granules are constantly upon the alert in order that harmful tendencies of disease may be anticipated. In capillary bronchitis, in peritonitis and in diphtheria, paralysis frequently occurs. Now, we do not wait until there are evidences of paralysis, but we apply our remedy before paralysis makes its appearance; that is, we anticipate it.

All schools of physicians use but one medicine to stimulate paralyzed nerves and to restore paralyzed muscles, and that remedy is strychnine. There is no other medicine but strychnine that can so effectually stimulate the vital functions and arouse nerve-force.

If strychnine is a proper remedy to use to cure paralysis, it is also a proper remedy to use to prevent paralysis. Whether paralysis is actually threatened or not, the administration of strychnine cannot harm the patient, but, on the contrary, it must greatly benefit him, for it is the best general tonic we possess. There is hardly a disease in which strychnine may not be given to good advantage to the patient.

In the treatment of infectious diseases, the *materies morbi* is never lost sight of, and every endeavor is made to eliminate and to neutralize it; first by the action of the seidlitz salt upon the intestines, kidney and skin; then by the administration of calcium sulphide throughout the entire course of the disease. In the blood, the sulphuretted hydrogen evolved from calcium sulphide may neutralize the products of germ activity, but it also acts upon the secretions.

The cause of disease always should be sedulously sought for, with the object of applying treatment directly to it. In typhoid fever a specific germ inhabits Peyer's patches. These germs and the absorption of their products cause the fever. Every endeavor should be made to clear the intestines of the fermenting germ-products and to prevent their absorption. Calomel and sulphocarbolate of zinc are probably the best remedies for this purpose and the latter should be given throughout the entire course of typhoid fever.

This is called *dominant treatment*, which means treatment directed against the cause of the disease, and if the cause is unknown, treatment must be directed against the most prominent symptom. Rachitis requires salts of lime. nflammation requires aconitine. Paludal infection requires quinine, etc. Whatever concomitant symptoms arise during the course of disease, as pain, diarrhea, vomiting or insomnia, require what is called *variant treatment.* This treatment is limited to the symptoms and is discontinued as soon as relief is obtained, while the dominant treatment is continued as long as the disease lasts.

DISPENSING GRANULES.

Granules are most conveniently dispensed in one-half drachm glass vials, or in wooden bottles, number "00." The former hold about one hundred granules and the latter about fifty granules. It is best to have the bottles labeled with the directions for the administration of the granules and the first two or three letters of the name of the remedy employed written thereon. If arsenite of strychnine is given, ar. st. is written; if aconitine, acon.; if atropine, at., and so on. When prescribing for young children, a solution is needed. In the office, three-ounce vials filled with water should always be at hand. The granules should be crushed in a mortar and dissolved in water.

If the granules contain bitter medicine, a little saccharine may be added. When visiting patients at their houses, a three-ounce vial may be used, or twenty-four teaspoonfuls of water may be measured into a tumbler, and the proper number of granules dissolved in this. Always be accurate, and know how many granules are given, and in how much water they are dissolved. To throw an unknown number of granules into an unknown quantity of water, with the directions to take a teaspoonful, is criminal carelessness, and shows rank ignorance of the potency of the granules. From such carelessness, harm to the patient must certainly follow.

Where patients, especially infants, require larger quantities of medicine than usual to afford relief, a note should be made of it and thus, by accurately observing the dose and its effect, a larger amount of useful information can be obtained, which cannot possibly be had in any other way.

Each standard granule represents, as a rule, a minimum dose for an adult, which may be repeated every half-hour or oftener. Most of the granules are not poisonous, and two or three may frequently be given at a dose. Aconitine, cicutine, gelsemin and veratrine should be given only in doses of one granule.

In prescribing for children, the writer has found it convenient to use a three-ounce vial or to measure twenty-four teaspoonfuls of water into a tumbler. Any other quantity of water may be used, of course, but it will be found, advantageous to use a certain quantity, in order that doses may be easily calculated.

If twenty-four granules were dissolved in a three-ounce vial, one teaspoonful would represent one granule, which is ordinarily a dose for an adult.

The following rule has been formulated by the writer for administering aconitine to children and it has proved a perfectly safe rule to follow when standard granules of any of the active principles are to be given, as veratrine, cicutine, gelsemin, hyoscine, etc.

Dissolve, in twenty-four teaspoonfuls of water, one granule for each year of the patient's age together with one additional granule. For a child of two years, dissolve three granules, for a child of one year two granules in twenty-four teaspoonfuls of water. An infant of six months requires only one granule in twenty-four teaspoonfuls of water, while one of three months requires one granule in forty-eight teaspoonfuls of water.

A teaspoonful of the solution may be given, usually, every hour, but, in severe cases, a teaspoonful of the solution may be given every half hour until improvement is manifested. This rule applies only to those medicines which are considered actively poisonous, as aconitine, veratrine, gelsemin, atropine, morphine, codeine, and hyoscyamine. There are many granules, as asparagin, calcium sulphide, emetine, iron ars., scillitin and zinc sulphocarbolate, which require larger doses and are not poisonous medicines.

There is absolutely no reason to fear evil results from administering alkaloids according to Burggræve's method. There is no safer method known and why physicians hesitate to use alkaloids in known quantities is difficult to comprehend. If the writer were compelled to give a prescription for active principles, to be filled by some druggist who has obtained his medicines from various manufacturers, there would necessarily be hesitancy on his part, but, when he is supplied by a reliable firm, as "The Abbott Alkaloidal Company," of Chicago, whose granules are uniform in action, and consequently must be accurate and pure, he feels no hesitancy in giving aconitine, hyoscyamine and strychnine even to the youngest infant.

The Abbott Alkaloidal Co.'s granules are even pure enough to use hypodermically, as the writer has done with glonoin, aconitine, morphine, atropine, pilocarpine and others many times.

When rapid effects are desired, they may be dissolved in hot water and administered.

Of course there are objections raised against dosimetry or alkaloidal medication. In the first place, because it is assumed by some to be a new system of medicine. But it is not a new system of medicine. It is stated by the late Dr. Marchal to be "*a great fact.*" It is simply a method of administering active principles in a perfectly safe and effective manner according to certain rules laid down by Professor Burggræve.

Some declare that dosimetry borders on homeopathy, because little pills are used, and because the physician dispenses his own medicines in a way similar to that of a homeopathic practitioner. This is rather puerile, as chewing a few granules of quassin is sufficient to show.

Others affirm that alkaloids are dangerous medicines. So they are in the hands of the unenlightened and so is any medicine, except homeopathic medicine. The danger is removed by knowledge sufficient for a proper diagnosis and by an understanding of the physiological action of remedies.

Those physicians who object to alkaloidal granules which contain known quantities, do not object to give infusions, tinctures, fluid and solid extracts, all of which must contain alkaloids, *and in unknown quantities*.

A physician cannot take a bottle of the tincture of aconite root, ordinarily found in drug stores, and tell exactly how much aconitine there is in a single dose. It must be that he does not want to know how much active principle he is using, and, therefore, gives the cruder preparation.

It is urged as another objection that all of the alkaloids or active principles are not simple bodies, and this is true. But those who prescribe them are aware of the fact. They know that veratrine, digitalin, and it may be some others, contain several active principles. While this is true, the important question in the treatment of the sick nevertheless remains, "What results are produced by the use of these medicines?" These results are known and are all that can be desired. Besides, the purest active medicinal substances which chemistry can separate from plants are always used, and, as soon as chemists can isolate simple active principles, they will replace the compound ones now in use.

Some objection has been very properly made to the common names given to the granules, as calomel, iron, mercury and sugar of lead, instead of the chemical names as found in the United States Dispensatory. Why these common names have been adhered to, I do not now know, and have no hesitancy in saying that it would appear more in accord with scientific knowledge, to use the recognized nomenclature of the authority above mentioned.

It has always appeared to me strange that physicians should ask if patients do not object to the change from the usual method of prescription writing to the use of the granules. On the contrary, it is the experience of the writer that patients always express themselves as highly pleased with the change; not only are the granules more palatable, but patients very quickly observe that the results obtained are better and follow more speedily than before, and they absolutely refuse to go back to the older ways. And not only does the patient learn of the wonderful potency and efficacy of the granules, but the physician himself is often astonished at the excellent results obtained, becomes inspired with a new enthusiasm and awakens to the fact that he can better alleviate and cure than formerly. The writer has had years of experience in writing prescriptions and also in dosimetry, and he has no hesitancy in saying that his results with dosimetric (alkaloidal) granules have far surpassed what he was able to do while using cruder preparations of drugs.

A THERAPEUTIC GUIDE

TO

ALKALOIDAL—DOSIMETRIC—MEDICATION

CHAPTER I.

ACONITINE (ALK.)

Standard granule—Gr. 1-134, gm. .0005, of the amorphous.

Dose—One every 1-4 to 1-2 or 1 to 2 hours, according to conditions.

Aconitine is an alkaloid, and is the active principle of the leaves and root of aconitum napellus. According to Wright the yield of aconitine from the root is 0.07 per cent.

In dosimetric medicine two forms of aconitine are used, the amorphous and the crystalline. The amorphous is prepared in granules which contain different amounts of the active principle. There are granules containing gr. 1-134, gm. .0005, and others containing gr. 1-500, gm. .000125. The crystalline is prepared only in granules which contain gr. 1-500, gm. .000125. If a granule of aconitine is held in the mouth and allowed to dissolve, within ten minutes a tingling sensation is perceived in the lips, tongue and fauces. If aconitine is taken in larger doses, or if smaller doses are repeated very frequently, tingling is felt in the fingers and toes, then in the hands and feet, and finally in all parts of the body. The tingling or numbness is the first physiological manifestation which shows that the system is fully under the influence of aconitine. Numbness is rarely produced while treating fever with aconitine. Probably the presence of fever prevents this action; at any rate it is not necessary in order to reduce fever that tingling should be manifest. Harm cannot result until the patient first feels this numbness.

In the treatment of adults, therefore no danger can arise from medicinal doses of aconitine, if the medicine is withdrawn when the patient perceives the sensation of numbness. When aconitine is indicated we are justified in pushing its use, if relief is not obtained, until tingling, the one physiological effect described above, is manifested. The tingling is produced by paralysis of the end-organs of the sensory nerve-fibres. This physiological effect is utilized in the treatment of neuralgia, hyperæsthesia, sprains and contusions. The first two may be treated by the internal administration of aconitine or by the local application of aconitine in the form of an ointment, in the proportion of two grains to the drachm of lard. Sprains and contusions may be treated by a liniment composed of tincture of aconite root one part, distilled ext. hamamelis five parts. In the treatment of many stubborn neuralgias, especially of the facial nerve, it is absolutely necessary, before relief can be obtained, to give aconitine in increasing doses until its full physiological effects are produced. A cure is more easily affected in the treatment of neuralgia, by combining aconitine with arseniate of quinine, with gelsemin, gelseminine or with morphine.

With reference to the tingling, the question might be asked, "How is it in regard to little children and infants who cannot express themselves or indicate their sensations?" In the first place; it should be remembered that tingling of the extremities is rarely produced by aconite in the dosimetric treatment of fevers. Further, as prominent symptoms subside, aconitine should be withdrawn and too much of the remedy is therefore not likely to be given. Lastly, the writer has never seen a case which was treated with aconitine, according to Burggræve's method, in which an untoward or alarming symptom, danger, or death has been produced.

This may appear to be a bold statement to make in the face of warnings uttered by various writers of prominence who say that aconitine should never be used internally, and that it is unsafe. If the physicians who made these remarks had ever used a reliable aconitine in small doses frequently repeated, in the treatment of fevers, it would have been impossible for them to have made such statements*.

It seems strange to read such adverse comments about a remedy which physicians use daily and know from experience that it is the most effective, the most reliable, and the safest of all the alkaloids of dosimetric medicine.

When one granule of aconitine amorphous, gr. 1-134, gm. .0005, is taken every half-hour, the number of pulsations and respirations is reduced, the arterioles are dilated, the capillaries are flushed with blood, the blood pressure is lowered through the action of the vaso-motor nerves and all of the secretions are augmented. The effect of aconitine upon the secretions is shown by the moistened tongue and skin, the increased flow of urine, and if the dose has been excessive, by the diarrhea, and sometimes by the vomiting of mucus.

In disease, the effect of aconitine upon the glandular structure is more marked than in health. During high fever the skin is hot and dry, the urine is scanty, the bowels are constipated and the tongue is dry, heavily coated, brown or glazed. The patient may be comatosed and may breath heavily or he may be restless and delirious; he may suffer also from great thirst, from general soreness and pain and the pulse may be rapid. Under these conditions if one standard granule of aconitine amorphous is given every half-hour, great changes are soon produced. The skin is covered with perspiration, the quantity of urine is augmented, the bowels are moved, the tongue grows moist, the patient is aroused from his coma, or is relieved of his restlessness and delirium; his thirst and pain disappear and his pulse, respiration and temperature are reduced to normal.

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* When aconitine was first isolated it was variable in strength, and using it in too large doses, death occurred. These observations have been handed down by those who imitate rather than investigate, and may be found in the so-called standard (?) text books of the day.—PUB.

By closely observing the tongue in fevers, we are able to judge of the progress of the action of aconitine. As long as the tongue remains dry, no impression has been made upon the general secretions and no progress has been made in the case; as soon as the tongue grows moist general improvement follows.

In the use of aconitine no question need be asked concerning the kind of fever for which it is suited. It may be used in all kinds of fevers, from those occurring during the first days of infancy, throughout life to extreme old age, irrespective of the cause. Wherever there is fever aconitine is indicated. Aconitine is not only the febrifuge of dosimetry, but without doubt, *it is the best antipyretic known.*

Aconitine is the great jugulator of fevers. Every endeavor should be made to administer it as early as possible in the course of an acute disease. While it is always easy to detect fever, provided a thermometer is used, it is not always easy to detect the cause.

Active treatment should, however, be begun at once. To give a placebo and wait until to-morrow in order to make a positive diagnosis before beginning active treatment, is an unnecessary loss of very valuable time. Fever is present and that is a sufficient indication for treatment, without waiting to make a positive diagnosis. The fever, indicated by a rise in temperature, is ominous and may prove serious. When the human body is plainly showing, by many signs, as an abnormal temperature, chilliness or rigor, headache, backache, general lassitude, a quickened pulse and respiration, that an inflammatory disease is threatening to attack some organ or structure, experience is powerless to indicate where the general storm which seems to be gathering throughout all parts of the organism will finally localize its entire force. If this force is localized, it will produce congestion and congestion usually leads to inflammation. It is our duty to attempt to prevent the general storm from making headway and attacking a single organ or, if too late for this, to jugulate the congestion or even to strive to hold in check the inflammation if it has occurred; and, notwithstanding the preponderance of opinion against it, this can frequently be done.

Every case which presents itself with prodromal febrile symptoms, if unchecked by nature or art, will terminate in fever. This should be fully realized and, as soon as the case is seen, whether fever is present or not, aconitine should be given every hour and continued until improvement is manifested. The result will be that in many cases the various symptoms will soon disappear. If fever has been present the temperature may be restored to the normal within twenty-four hours. Some cases may run their course but the probabilities are that the course will be much shorter under treatment with aconitine than with any other medicine. This has been the writer's experience and this is his chief reason for using aconitine in the treatment of fevers.

Not all cases can be jugulated, chiefly because their incipiency does not always come under the observation of the physician. Frequently I have seen temperatures of 101 to 105 degrees restored to the normal within twenty-four hours. Without positive evidence, of course, I nevertheless believe that, if treatment had been delayed one day, the termination could not have been so favorable. When first seen, some of these cases were in their early congestive, others in their early inflammatory stages. Marked inflammatory changes had not as yet occurred. Whatever organ or structure was threatened it contained an increased supply of blood. The vaso-motor nerves were paralyzed and allowed an afflux of blood into the threatened structure, while all of the remaining structures of the body were drained and their arterioles were probably contracted. The equilibrium of the blood supply was destroyed through inharmonious action of the vaso-motor centres. A hyperæmia was produced in one part and an anemia in all other parts of the body.

When aconitine is administered to patients whose blood-supply is thus disturbed, an harmonious action of the vaso-motor centers is soon produced. The contracted arterioles dilate and the blood is withdrawn from the congested area. A large amount of blood being thus drained off, the congestion is relieved, an inflammation is prevented, a disease is aborted.

The following plan for the administration of aconitine in fevers, which has been deduced from the extended personal experience of the writer, can be recommended as being perfectly safe and highly effective.

One granule of aconitine amorphous, gr. 1-134, is the dose for an adult and may be given every fifteen minutes, every half-hour, or every hour according to the degree of fever. If the temperature ranges between 100 degrees and 103 degrees a granule of aconitine amorphous, gr. 1-134, gm. .0005, should be given every half-hour. If, however, the thermometer registers from 103 degrees to 105 degrees the same dose should be given every fifteen minutes. In both cases, the medicine must be continued until some improvement is manifested; the same dose should then be administered every one or two hours.

If the patient is comatosed, one granule of aconitine may be injected subcutaneously every half-hour until the fever declines or until he is able to swallow. To children only a fraction of a granule should be given at a dose and this should always be administered in a solution, which is made as follows: Measure into a glass twenty-four teaspoonfuls of water, or use a three-ounce vial of water; drop into the water one granule of aconitine amorphous, gr. 1-134, for each year of the patient's age, together with one additional granule; that is, for a child one year old, two granules; for a child five years old, six granules, etc.; for an infant of six months, one granule. Of this solution, one teaspoonful may be given every fifteen minutes, every half-hour or every hour according to the degree of fever or the urgency of the case. In the treatment of children, as in the treatment of adults as soon as improvement is observed the medicine should be given less frequently. For infants under six months of age, the dose prepared for a child of six months should be administered as follows: If the child is under one month of age, fifteen drops of the solution may be given. If the child is one, two or three months old, one-half teaspoonful of the solution will be a sufficient and safe dose. If no improvement in the patient's condition follows within twelve hours, the dose may be gradually increased to one teaspoonful. The writer has frequently given aconitine to infants a few days old, and he has never known of harm resulting to the patient. The great safe-guard in the use of an alkaloid, according to the rules laid down by Burggræve, is that as soon as improvement is manifested the medicine should be withdrawn either gradually or entirely. Gradual withdrawal is best as it prevents a return of fever. How can the attendant know when to withdraw the medicine gradually and to begin giving it at greater intervals? If the patient has been restless and delirious and becomes quiet, if thirst, lassitude and soreness disappear, if the dry skin and tongue becomes moist, then, instead of giving aconitine so often, it should be given every one or two hours.

If after a time fever returns, aconitine may be given as frequently as at the beginning of the treatment.

It should be remembered that generally the pulse is restored to the normal before the fever has been reduced.

How long may aconitine be administered? It may be administered continuously for weeks but it is best to combine it with strychnine and digitalin, as it is in the preparation of the granule known as "Dosimetric Trinity."

Aside from its systemic use in the treatment of fevers, aconitine may be used to advantage in inflammations of the mucous membrane of the mouth and pharynx. For this purpose it should be given in solution and, when thus frequently administered, aconitine acts as a local anesthetic and relieves the pain which usually accompanies these diseases.

Aconitine reduces the number of respirations and should be used, therefore, in all inflammatory diseases of the lungs, in which there is always increased respiration. There is no remedy that can cure acute diseases of the entire respiratory tract so quickly and so thoroughly as aconitine. These are also among the diseases which can be aborted. In the treatment of bronchitis, emetine and scillitin may be combined with aconitine, to modify the character of the sputum and to make expectoration easier.

In cases of hypertrophy of the heart, in which the contractions have become too vigorous, one granule of aconitine given every two hours will reduce the force of the beat.

While aconitine may produce vomiting and diarrhea, when given in small doses to susceptible patients, and while large doses usually produce irritation of the stomach and intestines, still it is not contra-indicated in inflammatory diseases of the gastro-intestinal canal; because it may be administered with codeine, which prevents the irritant action of aconitine.

In all inflammatory diseases of the puerperal state, as pelvic peritonitis and metritis, aconitine reduces fever with remarkable rapidity. If adynamia is present, strychnine and digitalin must be added to the aconitine.

It should be remembered, that there is no disease accompanied by fever in which aconitine may not be given with advantage. In scarlet fever, measles, diphtheria and in small-pox, aconitine and calcium sulphide are among our best remedies. In acute articular and in muscular rheumatism, in erysipelas and in meningitis, aconitine will give better satisfaction in the reduction of fever, and consequently in the relief of pain, than any other antipyretic.

In the treatment of asthenic cases with aconitine, Burggræve uses the combination of aconitine amorphous, gr. 1-134, gm. .0005; digitalin, gr. 1-67, gm. 001; and strychnine arseniate gr. 1-134, gm. 0005. These three active principles are prepared in a granule known as Dosimetric Trinity No. 1. Another granule is prepared containing one-fourth of the quantity of the active principles found in No. 1 and called Dosimetric Trinity No. 2*. This latter granule may be used in the treatment of diseases of children. When Dosimetric Trinity No. 1 is used in the treatment of adults, or of children, it should be given in the same dose, and according to the same method, laid down for the administration of aconitine. This granule may be given in all cases of fever, especially cases in which the patient is delicate, and the heart is feeble. When preparing Dosimetric Trinity in solution for administration to children saccharin should be added to correct the bitterness.

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* These compound granules were first prepared and introduced by The Abbott Alkaloidal Company of Chicago.

In the granule known as Dosimetric Trinity, aconitine is an antipyretic, digitalin a heart tonic and antipyretic, while strychnine is a heart, lung and nerve stimulant. The slight antagonism which exists between aconitine and digitalin is not sufficient to destroy the property of aconitine as a febrifuge, and the digitalin aids aconitine in reducing fever. The combined action of digitalin and strychnine in sustaining the heart, and particularly the action of strychnine as a respiratory stimulant, prevents pulmonary depression by the action of aconitine.

According to Harley, death is produced in cases of poisoning by aconitine through its action upon the medulla. There is incomplete paralysis of the diaphragm and spasmodic action of the muscles attached to the upper part of the chest, but no complete muscular paralysis. The heart continues to beat after the lungs have ceased to perform their function.

"Fothergill's experiments on rabbits, guinea-pigs and cats, show that a lethal dose of aconitine ceases to be so if the animals have had an appropriate dose of digitalin from five to nine hours previously. In like manner, the lethal effects of aconitine are prevented by atropine and strychnine."

"While aconitine kills by paralyzing the respiration, atropine and strychnine, which act powerfully on the respiratory centers, are potent to prevent death."—*Nat. Dispensatory.* When aconitine is thus guarded by two such remedies as digitalin and strychnine, as in the Dosimetric Trinity, it is almost impossible for harm to follow, even though it be carelessly administered. That it is efficient in reducing fever, thousands of physicians can testify and the most skeptical must be convinced by a few trials of this combination.

Probably the most potent combination known for the reduction of fever, is formed of amorphous aconitine, gr. 1-134, gm. .0005; digitalin, gr. 1-67, gm. .001; veratrine, gr. 1-134, gm. .0005 and is named Abbott's Defervescent Compound No. 1*. There is also a granule prepared which contains one-fourth of the quantity of medicine found in No. 1, and this is called Abbott's Defervescent Compound No. 2. Abbott's Defervescent Compound No. 1, should be used for adults, and only in sthenic cases, in which the heart beats forcibly, the fever is high, the patient is strong, the face congested and the arteries in the neck and temples are visibly throbbing.

In many cases of pneumonia, pleurisy, rheumatism and peritonitis, this granule will be found of great value in quieting the heart's action and in reducing fever. One granule may be given every half-hour until improvement is manifested, after which it should be given every hour or every two hours.

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*These combination granules were first made and named as above by the Abbott Alkaloidal Company.

The Defervescent Compound No. 2 may be given to children from eight years old and upwards, but it should never be given to frail, delicate children. The Dosimetric Trinity should be used in these cases.

That which recommends aconitine for general use, especially for the treatment of children, is, not only its wonderful efficacy and safety, but its tastelessness. Children take it in solution without a murmur. In fact, they are not even aware that they are taking medicine.

Frequently it is the only remedy needed. Its administration is so simple, and yet so satisfactory that the writer feels it to be his duty to urge upon physicians, who do not dispense their own medicines, to carry with them at least some aconitine amorphous granules, and use them whenever fever is present. Physicians may feel, as did the writer when he first used this method, that one or two granules dissolved in twenty-four teaspoonfuls of water could not, when administered in teaspoonful doses, be productive of good, and much less of harm.

But of this the practitioner may rest assured, that a few trials of this wonderful and unfortunately not fully appreciated febrifuge will convince him that there is no remedy equal to it in reducing fevers "quickly, safely and agreeably."

CHAPTER II.

AGARICIN (GLU.)

Standard granule—Gr. 1-67, gm. .001.

Dose—Three to six (average four) granules repeated every two to four hours as necessary.

Agaricin is the active principle of agaricus alba. It is a white, crystalline substance, and is prepared in granules which contain gr. 1-67, gm. 001. Agaricin is used solely because of its action upon the sweat glands.

Atropine has held the chief place among therapeutic agents as the best remedy to check profuse sweating, particularly the night sweats which accompany phthisis.

Atropine, however, occasionally fails to produce the desired effect. Agaricin has lately replaced atropine, and has frequently cured the patient of sweating where atropine has proved useless. The custom is to try atropine first; if the sweating does not cease, agaricin is administered. It should be given in doses of four granules at bed-time, and, if the patient is awake, two granules may be given every two hours during the night.

This treatment should be continued until the sweating ceases, which usually occurs during the first week.

Unfortunately, agaricin has also a cathartic action which must be carefully watched. If diarrhea is produced, two granules of codeine, gr. 1-6 each, should be given with the first dose of agaricin at bed-time, or the number of granules may be diminished.

On the whole this may be considered rightfully to be the most desirable thing we possess for the condition above mentioned. The unpleasant effects often produced by atropine never follow the use of agaricin.

CHAPTER III.

APOMORPHINE (ARTIFICIAL ALK.)

Standard granule—Gr. 1-67, gm. .001.

Dose—As an emetic, six to eight hypodermically or twice the number by the mouth. As a relaxant, one or two every ten minutes until effect. As an expectorant, two, three or four every half to one hour.

Apomorphine is an "artificial alkaloid," prepared by heating in a glass tube one part of morphine and twenty parts of pure hydrochloric acid. The product is subjected to several purifying processes and is finally crystallized as apomorphine hydrochlorate.

Apomorphine is prepared in granules which contain gr. 1-67, gm. .001. Its properties are those of an emetic and expectorant.

When 1-15 to 1-10 of a grain of apomorphine is injected hypodermically, vomiting is usually produced in two to ten minutes. Very little nausea accompanies the emesis and the stomach evacuates its contents in two or three efforts. Except in cases in which patients manifest marked susceptibility to the action of apomorphine, depression does not usually follow its administration.

In an adult, suffering from bronchitis, death was produced by the hypodermic injection of

1-15 of a grain of apomorphine. This amount is considered to be a safe dose and it would not prove fatal except in cases of debility or in those persons who possess an idiosyncrasy against its use.

In other reported cases, in which an alarming condition or death was produced, the doses were excessively large.

In spite of the fact that apomorphine has produced serious results in several cases, it is still regarded, when injected subcutaneously, as a gentle, safe and rapidly acting emetic.

This remedy does not produce emesis as does sulphate of zinc or sulphate of copper, by irritating the mucous membrane of the stomach but by its action upon the spinal nerve-centers.

"That its operation does not result from elimination through the gastric mucous membrane is proved by the fact that intravenous injection is followed by vomiting, in animals whose aortæ have been previously ligated, so that no apomorphine could be conveyed to the stomach." —Nichols.

This remedy should be given, therefore, when an emetic is indicated in inflammatory diseases of the stomach. Apomorphine is chiefly used, however, in cases of poisoning, especially when narcotics have been taken in lethal doses and coma has been produced.

The inability to swallow, because of the coma, calls for some rapidly acting and effective emetic which can be given hypodermically. This remedy is also of great value when suicide has been attempted by taking poison and the person refuses to take an antidote.

If the hypodermic use of apomorphine were solely confined to the treatment of cases of poisoning, alarming symptoms and death would rarely result from its use. But when it is given in cases of capillary bronchitis, which generally occur in infants and in the aged, a class of patients usually unable to offer much resistance, great depression and collapse may be expected. In capillary bronchitis the internal administration of apomorphine, combined with various other remedies, is not only more efficacious than the hypodermic use but freer from harmful results.

When apomorphine is given hypodermically, from one-fifteenth to one-twelfth of a grain is the usual dose, which may be repeated at the end of twenty minutes if no effect has been produced. It is always advisable to have at hand a few tablets of apomorphine for hypodermic use in cases of poisoning. Those physicians who practice in places where medicines are not quickly obtained and where stomach-pumps are rare, should be particularly careful to be provided in this way.

J. S. Horsely reports a case of strychnine poisoning, in which doses of about 1-12 of a grain of apomorphine not only controlled the convulsions but eventually cured the case. The same gentleman reports cases of spasms in children which were also cured by injections of apomorphine. No remedy is more promptly successful in hysteria than apomorphine hypodermically.

Not only is apomorphine an efficient emetic but it has also proved to be an excellent expectorant. When administered in small doses, frequently repeated, it increases the secretions of the mucous membrane of the entire respiratory tract. This remedy is indicated, therefore, in all cases in which the cough is dry or the sputum is tough. It is of especial value in two dreaded diseases, in acute laryngitis and in capillary bronchitis. The writer has never found a satisfactory remedy in the treatment of this latter disease until he began to use apomorphine; since which time he no longer dreads to meet this formidable enemy. Success in the treatment of capillary bronchitis depends upon the frequent administration of small doses of apomorphine, together with strychnine, throughout the course of the disease. Strychnine is given to stimulate the vital functions and to prevent paralysis.

The danger in capillary bronchitis is carbonic acid gas poisoning, followed by paralysis. By the early use of strychnine the nerve-centers of respiration and of cardiac movement are stimulated, so as to resist, for time at least, carbonic acid poisoning.

Meanwhile, apomorphine, which has also been given in conjunction with strychnine, causes a bronchial secretion to be formed, that not only loosens the plugs of tenacious material which are occluding the bronchioles but, by the exudation of this thin secretion, depletes the swollen mucous membrane. The obstruction is removed and again air passes freely into the alveoli; this permits oxidation of hæmoglobin and elimination of carbonic acid gas.

Strychnine also aids the expectorant quality of apomorphine by increasing the irritability and contractility of those muscles which have as a part of their function the expulsion of mucus; and it also improves the tone of the entire muscular system. The more debilitated the patient, whether infantile or aged, the more urgent is the demand for strychnine.

It is absolutely wrong to wait before administering strychnine until symptoms of paralysis appear, as manifested by the abdominal muscles, at their attachment to the costal cartilages, being drawn in during each inspiration. It is our duty to determine, if possible, the dangerous tendencies of every disease, and, by the administration of properly selected remedies, to strive to prevent them.

To wait until dangerous symptoms appear is an irreparable loss of valuable time. Experience should teach us that certain tendencies are likely to occur during the course of certain diseases. It seems reasonable that, if we fortify the patient properly against these harmful tendencies, they must be only slightly injurious or may be completely averted.

Not only in capillary bronchitis but in the bronchitis of the larger tubes, apomorphine is a valuable remedy. It may be given even to debilitated phthisical patients. If a stimulating action is required, monobromated camphor may be given in conjunction with apomorphine; if an anodyne action is required to relieve painful and harassing cough, codeine and apomorphine make an excellent combination.

In the treatment of croup, apomorphine should be the first remedy given. The dry, harsh cough and the accompanying dyspnea are relieved without the necessity of producing nausea or vomiting. As suggested by Dr. Abbott, apomorphine, hyoscyamine and strychnine form an excellent combination, from which good results may be obtained.

Formerly, when urgent symptoms were manifested in croup, Turpeth's mineral was the sheet anchor of the physician. Now, apomorphine in small doses, repeated every fifteen minutes, brings relief gradually, surely and harmlessly. Can we say as much of Turpeth's mineral?

To illustrate the efficacy of apomorphine, the following case of croup is given. The patient was a boy of five years. Besides the constant croupy cough, there were marked dyspnea and restlessness, the pulse was 160, the temperature was 103 degrees and the respirations were 58. The treatment was as follows:

Thirty-six granules of apomorphine and six granules of Dosimetric Trinity No. 1, were dissolved in twenty-four teaspoonfuls of water. Of this mixture, one teaspoonful was ordered to be given every fifteen minutes until the breathing became easier, after which the same amount was to be given every half-hour. The patient was seen again six hours later, and was found to be in the following condition: The temperature was 100 degrees, the pulse was 150 and stronger than before, the respirations were 42. The medicine was ordered to be given every hour. Improvement continued, and within a few days the patient was well. In another severe case of laryngitis, which occurred during an attack of measles, in the case of a boy of seven years, intubation was thought necessary, but postponed, and apomorphine, in doses of gr. 1-48, was given every fifteen minutes. Improvement began after several doses had been given, the cough grew looser, the breathing became easier and remained so during the continuance of the measles.

When apomorphine is indicated in inflammatory diseases of the bronchi and fever is present, aconitine should always be given in combination with it. If cough is troublesome and is not reduced by the increased flow of mucus, codeine or hyoscyamine may be given with apomorphine.

When a solution of apomorphine is first made it is perfectly clear; after awhile, however, it becomes green from oxidation, but this does not interfere with its excellent expectorant qualities. In all diseases of the respiratory tract, where ipecacuanha or its active principle, emetine, is indicated, this remedy may be used with better results and without dangerous consequences.

The dose of apomorphine, as an expectorant, for adults, is two, three or four granules every half-hour or every hour.

A child of six years old readily bears one granule, so that in preparing a solution, twenty-four granules may be dissolved in twenty-four teaspoonfuls of water.

For a child of six years, dissolve twenty-four granules in twenty-four teaspoonfuls of water.

For a child of four years, dissolve eighteen granules in twenty-four teaspoonfuls of water.

For a child of two years, dissolve twelve granules in twenty-four teaspoonfuls of water.

For a child of one year, dissolve six granules in twenty-four teaspoonfuls of water.

An infant may be given one-half teaspoonful of the solution prepared for the one-year-old child. If improvement does not follow within three to five hours the dose in each case should be increased.

CHAPTER IV.

ARBUTIN (GLU.)

Standard granule—Gr. 1-67, gm. .001.

Dose—One every fifteen to thirty minutes till effect and then as needed to sustain the same.

This principle is present in quite a number of what we call diuretic plants—chimaphila, gaultheria, uva ursi, trailing arbutus, etc. In large doses it is a drastic cathartic, also an irritant to the kidneys as well, while in small doses it is a gentle stimulant to urinary secretion. It is an elegant diuretic, soothing the whole urinary tract and stimulating a good flow of normal urine.

It is almost tasteless in properly dilute solution, and should always be given in this way, or followed with a free drink of water. It is particularly nice in the treatment of children, no matter how young, to whom it is difficult to give the rank-tasting diuretics so long in use. In the enuria of the new-born it works like a charm. The ordinary rules of dosage, of course, apply.

CHAPTER V.

ASPARAGIN (GLU.)

Standard granule—Gr. 1-67, gm. 0.001.

Dose—Four granules every 1-2 to 1 or 2 hours as needed.

Asparagin is a crystalizable, organic principle, prepared chiefly from the fresh sprouts of the common garden asparagus. The part of this plant which is very frequently and erroneously used in domestic practice is the root. While this contains glucose, extractives and other constituents, it contains little or no asparagin.

In "Dosimetry" asparagin is prepared in granules each containing gr. 1-67, gm. .001. It is not poisonous and may be given in doses of from one to three grains without producing injurious results.

Formerly, when a patient presented himself with acute or chronic inflammation of the bladder, buchu, hyoscyamus and acetate of potash were the remedies usually prescribed, and they are still used by many physicians who adhere to the older method of administering crude drugs. The combination is not without virtue but its taste and odor is disagreeable. In alkaloidal medication asparagin replaces the buchu of the older practice. It is tasteless, a quality appreciated not only by children but also by adults. Asparagin has a soothing effect, similar to that

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of buchu, upon the inflamed and irritated mucous membrane of the entire urinary tract.

It acts as an alterative upon the glands of the mucous membrane of the urinary organs, restoring them to their normal functions, diminishing the amount and changing the character of the mucus and, thereby, allaying inflammation. Before a prescription is made for a case of cystitis it is absolutely necessary to discover the cause of the disease.

Beneficial results cannot follow medical treatment when surgical means are necessary to remove the cause.

Among the chief causes of irritation and inflammation of the bladder are the following: In the male, calculi, enlarged prostate gland and gonorrhea; in the female, uterine displacement and urethral caruncles. After a careful examination, and the exclusion of all surrounding structures and organs as causes in the production of vesical irritation, if inflammation of the mucous membrane alone remains, asparagin is the remedy indicated.

If cystitis is traumatic or symptomatic in its origin and the cause has been removed and there remains an irritable condition of the bladder, asparagin is still the medicine to be administered. It may be given alone in doses of four granules every half-hour or every hour for adults, but for children three or four years of age one granule every hour will be sufficient.

When pain and tenesmus are pronounced, with frequent desire to urinate and with a scalding sensation along the urethral tract, my favorite prescription; from the use of which I have obtained excellent results, is asparagin 48 granules; hyoscyamine 24 granules; lithium benzoate 48 granules. Dissolve these granules in a three-ounce bottle or in twenty-four teaspoonfuls of water and of this mixture order a teaspoonful, well diluted, to be taken every half-hour or every hour.

If fever is present twenty-four granules of aconitine apomorphus should be added to the above prescription.

An important aid to the further treatment of cystitis is found in the administration of saline cathartics, as Abbott's Effervescent Seidlitz Salt. Besides the beneficial effects derived from free purgation, the urine is modified in its character by the presence of alkaline salts which have been eliminated by the kidneys. Litmus paper should be frequently used to test the reaction of the urine. If the urine is ammonical and contains ropy mucus, free use should be made of salicylic, boracic and benzoic acid or the salts of benzoic acid, but it is better not to employ mineral acids for they have little influence in modifying alkaline urine. If the urine shows a highly acid reaction, four granules of carbonate of lithium should be given every hour until improvement is manifest.

CHAPTER VI.

ATROPINE (ALK.)

Standard granule—Gr. 1-250, gm. .00025.

Dose—One to four, according to the effect desired. The favorable action of minute dosage in some conditions should not be forgotten*.

Atropine is the principle alkaloid of atropa belladonna.

Alkaloidal granules of atropine contain either 1-250 or 1-2500 of a grain. Preference should be given to the use of the sulphate as it is much more soluble than the uncombined alkaloid.

Atropine is a wonderful remedy. It may be applied in the treatment of a great variety of diseases.

Of course, medicines cannot be intelligently and beneficially prescribed without a knowledge of their physiological action, and this is particularly true of atropine.

Success cannot follow the use of atropine in the treatment of diseases unless the physician knows that it checks secretions, that it relaxes spasmodic contractions of voluntary and involuntary muscles, that it stimulates and quickens depressed action of the heart and lungs, that it primarily contracts and secondarily relaxes the arterioles, augmenting the quantity of blood in the integument and, lastly, that it increases the temperature of the body.

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*Atropine has a well recognized action in minute dose that is directly opposite to its action in the dose usually used. In large dose it relaxes while in minute dose, gr. 1-1000 to gr. 1-3000, it stimulates the vaso-motors to contract and gives prompt relief in many painful regional congestions, notably congestive headaches.—Pub

No remedy has been so successful in checking "night-sweats" in cases of phthisis or the general or local sweating accompanying other diseases. To overcome local sweating, atropine should be applied locally in the proportion of two grains to the ounce of water. In the treatment of night sweats the best results are obtained by the administration of a single dose at bed time of from two to four granules, each containing 1-250 of a grain of the sulphate.

The profuse watery discharge from the eyes and nose during an attack of acute coryza is frequently relieved by a single dose of two or three granules, gr. 1-250 each, or by the administration of one of these granules every half-hour until the desired result is obtained. Ptyalism, whether produced by mercurial or other forms of stomatitis, or occurring during pregnancy, is rapidly checked by the use of atropine.

In order to obtain the best results with this remedy, in the treatment of diseases of the respiratory tract, we should prescribe it only in those cases where there is free secretion. The paroxysms of asthma are frequently relieved with surprising rapidity when atropine is given hypodermically. It may also be given internally, or the same result may be obtained by smoking belladonna leaves and inhaling the smoke. In the treatment of asthma, Bartholow says, "When the skin is dry and hot, and the bronchial secretion scanty and the pulse is much accelerated, atropine adds to the distress."

In the treatment of whooping cough, wonderful results are frequently obtained by the use of this remedy. The best way to give atropine in this disease is in doses sufficiently large to produce physiological effects which are manifested by dryness of the mouth and throat, dilation of the pupil and redness of the skin. Two doses should be given daily, one before breakfast and the other at bedtime. As soon as the physiological effects of atropine are manifested, the number and severity of the paroxysms are rapidly diminished. The way to prescribe atropine for children is to dissolve in twenty-four teaspoonfuls of water, one granule, gr. 1-250, for each year of the patient's age with one additional granule. Of this solution a teaspoonful should be given morning and evening. If physiological effects are not produced, an additional granule should be added to the original prescription; if there are still no results, two granules may be added next day, three additional granules the next day and so on until some effect is produced. When the physiological dose is determined in this manner it should be continued until there is a decided improvement.

Another method is to give a teaspoonful of the original prescription every half-hour until the mouth becomes dry, which will be manifested by a desire to drink frequently, or may be discovered by inspection. But the latter method should be employed only once daily throughout the spasmodic stage of whooping cough.

Atropine primarily increases the number of pulsations and respirations, together with the temperature of the body. Bolles gives the following indications for its use: "In excessive collapse with failing pulse and respiration, with reduction of temperature and cold perspiration, life is in danger and atropine may be the means of saving it. There is no other remedy which so completely antagonizes these symptoms." Hare says: "If symptoms of collapse come on—and they should be anticipated in the old, or in cachetic persons and young children—a hypodermic injection of 1-60 to 1-30 of a grain of atropine will be most effective to prevent it."

Congestive chills can be prevented by taking three or four granules of atropine, gr. 1·250 each, one hour before the time of the expected chill. Even during a chill atropine may be given with the assurance of shortening its duration.

In the treatment of internal hemorrhages, the use of atropine is much neglected. In recurrent pulmonary hemorrhages, the bleeding may be prevented by anticipating the attack by a hypodermic injection of 1-80 of a grain, or four granules of atropine may be given internally. In menorrhagia or metrorrhagia and hæmaturia, when other remedies have failed, this remedy frequently effects a cure, when a cure can be affected by medicines alone.

Atropine reduces contractions of voluntary and involuntary muscles and is indicated therefore in rigidity of the os uteri during labor; in tenesmus of the bladder and rectum and in stomachic, intestinal, hepatic and renal colic. In torticollis, or in spasm of single muscles, atropine should be administered hypodermically into the muscle affected.

In the treatment of incontinence of urine, no remedy produces results so satisfactory as those obtained by the use of atropine. It is particularly indicated where the mucous membrane of the bladder is sensitive. In treating nocturnal incontinence either a single large dose of the medicine should be given at bedtime, or preferably a number of small doses (according to the method of treating whooping cough) every half-hour until dryness of the mouth is produced. The kidneys eliminate atropine from the blood, and by its presence in the urine it locally relieves the sensitive mucous membrane which is irritated by the presence of small quantities of urine and produces frequent and uncontrollable expulsions.

Hypodermic injections of atropine, gr. 1-60, at the seat of pain often cure sciatica and facial neuralgia.

Dysmenorrhea and ovarian pains are also controlled by the internal use of the medicine. Migraine is often cut short, especially if the remedy can be given in anticipation of the attack.

Atropine never should be given to nursing women because of its power to arrest the secretion of milk. When it is necessary to check the functions of the mammary gland, it may be given internally or applied externally to the gland. Three grains to the ounce of water is sufficiently strong, and the remedy is best applied by wetting strips of old linen with the solution and laying them on the breast; when dryness of the mouth is observed, the cloth should be removed, because this indicates that the physiological effect has been attained, and it is never safe to pass beyond the physiological limit of any medicine.

Atropine is directly antagonistic to the action of pilocarpine; each remedy can therefore be used as an antidote to overcome the evil effects of the other. In opium poisoning the best physiological antidote is atropine. As atropine increases peristalsis and prevents the griping produced by the action of cathartics, it is important as an aid to this class of medicines.

The dilation of the pupil; produced when the solution of atropine is dropped into the eye, is of great value in preventing adhesions and hernia of the iris, in relieving intra-ocular pressure and in reducing inflammation of the iris, also in permitting opthalmoscopic examinations to be easily made.

Primarily, atropine contracts and secondarily relaxes the arterioles. The augmented pressure which at first occurs relieves congestion and increases arterial and capillary circulation and the quantity of blood in the integument. This action is utilized in the treatment of those diseases which involve the skin, as erysipelas, scarlet fever and neurosis. When depression is present in erysipelas and scarlet fever and the eruption is ill-defined or tardy, atropine changes the character of the eruption and very materially improves the condition of the patient. This primary action of atropine is also utilized in the treatment of congestions and hemorrhages. A single dose of three or four granules should be given as early as possible.

When indications are present which require the use of atropine and there is doubt regarding the susceptibility of the patient to the action of this remedy, or from whatever cause hesitancy exists in regard to its administration, the following plan should be followed as one from which no possible harm can result. One granule, gr. 1-250, should be given every half-hour to adults until there is dryness in the mouth and throat. By this time beneficial results are frequently manifested in acute cases. If more prolonged action is deemed necessary, one granule should be taken every two or three hours. This method can be employed in the treatment of all cases where atropine is indicated, but sometimes better results are obtained by a single large dose in cases of emergency, as in congestive chills, hemorrhages and shocks.

When atropine, or any other medicine is administered in small and frequently repeated doses, the effect is gradual, and when the results are obtained, the medicine is given at greater intervals, or is withdrawn altogether. It is impossible to know how much of any remedy will be needed to overcome a disease or remove a symptom. Undesirable results are more likely to follow a single large dose, than small doses frequently repeated. This latter method is preferable when prescribing atropine for blondes. They are more susceptible than brunettes to its action. The redness of the skin (which is secondary) frequently follows small doses of this drug and is most marked in those who have light complexions.

Children bear atropine proportionally better than adults. While atropine can be given in doses of 1-20 of a grain without very serious results, the aim should always be to use as small a dose as will alleviate the symptoms and cure the disease. Atropine in doses of 1-10 of a grain administered to adults would probably cause death in the majority of cases. There would be produced increase of the pulse-rate and respirations, active, talkative delirium, convulsions, stupor and paralysis. In dosimetric medication, poisoning cannot occur if minimum doses are given according to the rules formulated. Except in cases of collapse, as in chloroform narcosis, opium poisoning or extreme shock, 1-60 of a grain of atropine should be exceeded only after full consideration of all the circumstances connected with the case.

CHAPTER VII.

BRYONIN (GLU.)

Standard Granule—Gr. 1-67, gm. .001.

Dose—Two every two hours until effect, then one granule every two or three hours to sustain the same.

Bryonia Alba contains bryonin, a glucoside, and bryonidine, an alkaloid. It was discovered by Walz in 1859. Bryonin is used medicinally in preference to bryonidine because of its milder action. The latter is a decided irritant to the mucous membrane of the gastro-intestinal canal. In sufficiently large doses, even bryonin is a powerful hydrogogue cathartic. It also stimulates the kidneys and thus increases the quantity of urine.

The indications for its use are therefore plain. In all cases of dropsy, whether of the serous cavities or of the cellular tissues, the absorption of the effused fluid is successfully accomplished by the use of bryonin. In relieving torpidity or congestion of the liver and so-called "biliousness," bryonin is a remedy of value.

As a result of the inflammation of serous membranes, after fever has been reduced by aconitine, there frequently remain various painful and annoying conditions which may continue for years; *e. g.*, the severe headaches which occur after an attack of meningitis; the "stitch in the side" which follows pleurisy; the precordial pain of chronic pericarditis and the pain and stiffness of joints which remain after an attack of rheumatism are all relieved and frequently cured by the administration of bryonin. The principal use, indeed, of bryonin is in the alleviation and cure of chronic inflammations of serous membranes. After a decided physiological impression has been made with the drug, beneficial results are more rapidly and effectually produced by its subsequent use.

Two granules, each containing gr. 1-67, should therefore be given every two hours until the bowels are thoroughly evacuated, after which one granule may be given every two or three hours. If the patient is robust, and is habitually constipated, the dose may be increased by one or two additional granules, but if the patient is delicate and the bowels respond quickly to the action of cathartics, the dose should be reduced. If bryonin produces pain, a granule of atropine or hyoscyamine should be added to each dose. To effect a cure in chronic inflammations of the serous membranes, several weeks of continuous treatment may be required.

Success follows the treatment of chronic diseases only after perseverance in the use of properly selected remedies. The rule is not to change medicines often when treating chronic cases—to oppose the chronic diseases chronic treatment.

CHAPTER VIII.

CACTIN.

Standard granule—Gr. 1-134, gm. .0005.

Dose—One or two granules every hour or two according to the necessities of the case.

The active principle of Cactus Grandiflora, or Night-blooming Cereus, is a valuable remedy. In dosimetric practice, it is used in granules as above. It is a cardiac stimulant, and is of special value in the treatment of functional derangement of the heart. In palpitation connected with dyspnea, sexual excesses, nervous disorders, muscular and mental exhaustion, excessive use of tobacco, tea and coffee it has proved to be a very useful remedy.

It decreases the heart's action and increases the blood-pressure but it does not produce such vigorous contractions as does digitalin. According to P. W. Williams it shortens the diastole, and is, therefore, contra-indicated in mitral stenosis, but it is especially indicated in aortic regurgitation. When dyspnea and œdema are produced by cardiac diseases, it frequently gives great relief. It is a safe remedy, free from cumulative action; it increases the appetite and may be used whenever digitalin fails to effect a cure or where the latter disagrees with the patient.

CHAPTER IX.

CAFFEINE (ALK.)

Standard granule—Gr. 1-6, gm. .01.

Dose—Two to four every half to two hours according to effect desired. For children, gr. 1-67 is best used.

Caffeine is an alkaloid obtained from coffee, from tea leaves and various other plants. It is distinguished from all other alkaloids by the large amount of nitrogen which it contains. Its physiological action is similar to digitalin and it may be used whenever the latter is indicated. The remarkable quickness with which results are produced by the use of this drug gives it a decided advantage over digitalin. It increases the blood-pressure, lessens the pulsations of the heart and augments the quantity of urine excreted. As a means, therefore, of reducing dropsical effusions caffeine may be successfully used.

When, during typhoid fever, pneumonia or other serious diseases, the heart shows signs of failing and the pulse is feeble and easily compressed, caffeine should be given daily instead of alcohol. It sustains the heart's action and stimulates the nerve-centers. In cases of collapse, shock or syncope, hypodermic injections of caffeine, gr. 1, should be administered. When there is a tendency on the part of the patient to become drowsy or comatosed, caffeine can be used to induce wakefulness. If the pulse is frequent and feeble and the secretion of urine scanty or suppressed, this remedy increases the strength of the heart, reduces the number of its pulsations and re-establishes the urinary secretion.

In the treatment of dropsical effusions, caffeine should always be tried, especially if digitalin fails, or it may be combined with digitalin. The increase of the amount of urine does not depend entirely upon the increase of blood-pressure, but also upon the action which caffeine exercises in stimulating the rodded cells of the uriniferous tubules.

Caffeine is very frequently used in the treatment of headaches, especially when resulting from overwork or worry. In prescribing for adults, caffeine granules containing 1-6 of a grain should be used, while in the treatment of children, granules containing 1-67 will generally produce the desired result. Two, three or four granules may be given every half-hour when the object is to relieve headache or the acute suppression of urine. In dropsy, or in diseases of the heart not requiring immediate relief, four or five granules should be given every two or three hours. In cases of emergency, as in syncope, collapse or coma, a grain may be given hypodermically. Caffeine is an alkaloid possessing no very marked poisonous properties, and when it is indicated and relief does not follow its administration in small quantities, the dose may be increased to three or four grains.

When the brain or the muscular system is exhausted, and food, rest and sleep are required, especially if additional demands for work seem imperative, man resorts only too often to the use of alcoholics. Stimulants are used to whip tired nature to compel her to yield still more energy, but alcohol ought not to be used in this way to stimulate the already overtaxed brain and muscles with the hope that somewhere there exists latent strength which can be called forth on demand; this use of alcohol is seductive, injurious and fallacious. Leaving out of consideration the omnipresent danger of acquiring the alcohol habit, those who possess a knowledge of the physiological action and chemistry of the remedials must find caffeine pre-eminently more effective than alcohol as a stimulant to the heart, brain and muscle, while at the same time its use is totally devoid of danger, except that possibly, of overstimulating the heart. Used properly, it strengthens the heart's action, increases mental activity and relieves muscular fatigue.

CHAPTER X.

CALCIUM SULPHIDE.

Standard granule—Gr. 1-6, gm. .01.

Dose—One to three or four granules every half-hour, or every one or two hours.

Calcium sulphide, so-called, is a loose chemical combination or a mixture in which calcium sulphate is the base and sulphuretted hydrogen the active agent of which a good specimen must contain at least 30 per cent.

It decomposes very readily on exposure to the air, which accounts for the fact that the calcium sulphide of the shops is usually inert. There is enough oxygen in the air of even a tightly corked, but pretty full container to spoil a layer on top, so that the next prescription is filled from what is practically calcium sulphate. While strictly fresh, calcium sulphide should be put into a protected pill or granule like those so carefully and successfully prepared by the Abbott Alkaloidal Co., whereby the full strength of this most valuable agent is retained. When calcium sulphide is taken internally, the patient's breath emits the disagreeable odor of sulphuretted hydrogen and eructations of the same gas also occur. It is thus clearly demonstrated that this salt is decomposed within the body, and that sulphate of lime and sulphuretted hydrogen are formed. The sulphate of lime is insoluble and passes out with the feces, and the sulphuretted hydrogen is absorbed into the blood and eliminated by means of the skin and lungs.

Because of the elimination of sulphuretted hydrogen from the blood by the lungs, calcium sulphide produces excellent results when used in the treatment of diseases of the bronchial tubes. Sulphuretted hydrogen is thus brought into contact with the glands of the respiratory mucous membrane and stimulates them.

In all catarrhal diseases of the lungs where the sputum is scanty or tough, in measles and pertussis where the cough is distressing, in chronic diseases of the lungs where the expectoration is in a state of putrescence the character of the mucus is materially changed, and the distressing cough is relieved, by the administration of calcium sulphide.

Through the researches of Ringer and Murrell it was learned that calcium sulphide possesses the property of preventing and aborting boils, particularly when they occur in successive "crops."

This remedy is frequently used to reduce inflammation and check suppuration of the lymphatic glands, and every indication tends to show that it will prove a valuable remedy in the treatment of carbuncles. In prescribing for patients afflicted with these diseases, two or three granules, each containing 1-6 of a grain, should be given every one, two or three hours, according to the severity of the attack.

A most important application of sulphide of calcium is in the treatment of zymotic diseases.

Measels, whooping-cough, scarlet fever, small-pox, diphtheria and erysipelas are all more easily controlled, and are freer from sequelæ when this remedy is used than when other agents are employed. Calcium sulphide should be given throughout the entire course of these diseases.

If complications arise, this remedy should still be continued, either alone or in combination with those remedies which are required to meet the new conditions.

When fever is present, aconitine should be given. When there are tendencies toward collapse and signs of heart-failure, caffeine is the remedy indicated; when the danger is paralysis, as in diphtheria, strychnine should be administered. When the throat is inflamed, and is the seat of ulceration, or of diphtheritic deposits, it is best to give calcium sulphide in solution.

In severe cases the remedy should be given every fifteen minutes. By its frequent administration in throat diseases, the solution of calcium sulphide almost constantly bathes the inflamed and infected mucous membrane, and aids in bringing about a speedy cure.

The septic materials produced by the various bacilli of zymotic diseases are probably neutralized by the presence of sulphuretted hydrogen in the blood. Physicians who have used calcium sulphide in the treatment of infectious diseases testify to its wonderful efficacy in preventing or counteracting septic infection.

Calcium sulphide produces good results, not by destroying the bacilli, but by neutralizing the poisons which are produced by them. Further, the action of this medicine upon the glandular structures of the respiratory and intestinal tracts produces an increase of the secretions and in this way eliminates morbid materials from the blood.

It is said that anemia is produced by the disintegration of the red blood-corpuscles through long continued action of the sulphides. This action of calcium sulphide need not be considered in the treatment of acute infectious diseases (except in pertussis) because of their short duration.

Unless calcium sulphide is taken continuously for four or five weeks anemia can rarely be produced. In the treatment of whooping-cough the writer has frequently given calcium sulphide continuously for three or four weeks, always with marked reduction in the number and severity of the paroxysms, but he has never seen anemia follow its use. If, however, anemia exists, or if its occurrence seems probable, one or two granules of arseniate of iron should be given with each meal.

It is important to remember that a fresh solution of sulphide of calcium should be prepared daily and kept in a well corked bottle. Free access of oxygen decomposes the medicine, a disagreeable odor of sulphuretted hydrogen is emitted, and, besides this, the therapeutic quality of the solution is destroyed.

It is best to measure the doses in a medicine glass, for metal spoons are blackened by contact with calcium sulphide, and this frequently conveys the impression that the medicine must be unusually strong to produce such an effect. If a spoon is used it should not be allowed to remain in the solution, and an explanation of the discoloration ought to be given, with the assurance that no harm can result to the patient.

Calcium sulphide is a harmless remedy, and may be given in doses of four or five grains without injury.

In treating adults for erysipelas or for chronic lung diseases where the object is to overcome the offensiveness of the sputum or to reduce the tenacity of the mucus, two or three granules, gr. 1-6 each may be given every one, two or three hours.

In the treatment of whooping-cough, a dose should be given every two or three hours. For infants one year old, eight or ten granules should be dissolved in a three-ounce vial and a teaspoonful of the solution administered every two or three hours. To children from two to five years of age, a single granule may be given at a dose. To patients from five to ten years of age, one or two granules given every two hours is a proper dose.

It will be found that those who will swallow the granules do not tire of the medicine so quickly as when it is given in solution.

In all cases where the eructations of sulphuretted hydrogen gas are excessive, or are complained of, the dose should be diminished and given, preferably, before meals when there is no acid in the stomach, for the acid of the gastric juice readily decomposes calcium sulphide.

CHAPTER XI.

CONIINE HYDROBROMATE; CICUTINE HYDROBROMATE.

Standard Granule—Gr. 1-67, gm. .001.
Dose—One, two or three every half to one hour.

Coniine or cicutine as it is often called, is a valuable alkaloid, obtained from the leaves and fruit of conium maculatum or spotted hemlock. Cicutine, which is obtained from the herb cicuta virosa, or water hemlock, is also a valuable alkaloid, and by some authorities is said to be the same as coniine.

Bartholow says: "The action of coniine is primarily and chiefly on the end-organs of the motor nerves. When an active dose of coniine is administered, weakness of the legs and a sense of weight and fatigue of these members is first experienced. The eyelids become heavy, and droop somewhat and double or confused vision, a feeling of torpor of the mind, and giddiness follow." Harley says: "The whole muscular system is completely relaxed."

Coniine is indicated, therefore, in all cases of exalted muscular movement, in spasmodic action of muscles such as occur in asthma, chorea, epilepsy, tetanus and hydrophobia. Coniine has also been used successfully in the treatment of neuralgia and cancer, especially uterine cancer.* Hydrobromate of coniine is undoubtedly the best preparation, and the dose ranges from 1-30 to 1-15 of a grain. In the treatment of adults, one two or three granules should be given every hour until there is some relief, or until there is a sense of weight or heaviness of the legs or eyelids. The dose should then be given every three or four hours, in order to keep the patient under the influence of the remedy.

In cases in which the symptoms are severe and the demand is urgent, two or three granules may be administered hypodermically as often as every hour, until there are some evidences of the effect of the medicine. In the treatment of children, one or two granules for each year of the patient's age should be dissolved in twenty-four teaspoonfuls of water, and a teaspoonful should be given every hour or every two hours according to the urgency of the case. Coniine is a very useful remedy in reducing the number and the severity of the paroxysms in whooping-cough.

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*The author calls your attention to the power of this drug over neuralgia, particularly that of uterine cancer. It is our opinion that the effect of coniine on the sensory nerves is not sufficiently well understood. This is particularly manifest when very small doses are used. Small doses affect the sensory terminals before the motor terminals are influenced. We desire particularly to emphasize its usefulness in the pains and backache of menstruation, especially functional dysmenorrhea, one granule every fifteen to thirty minutes until relief is obtained.—PUB.

CHAPTER XII.

COLCHICINE (ALK.)

Standard granule—Gr. 1-134, gm .0005.

Dose—One or two every one-half to two hours till effect.

Colchicine is the alkaloid of Colchicum Autumnale, or Meadow Saffron, and is prepared in granules containing gr. 1-134, gm. .0005. The medicinal virtue of the tincture, extract and wine of colchicum is due to the effect of the active principle of colchicine. The physiological action of colchicine depends upon the number of granules given and upon the frequency of their administration. By giving one or two granules every two hours the activity of the skin and kidneys is increased and, in some susceptible patients, catharsis is produced, after eight or ten granules have been administered.

After one or more doses of three or four granules, given every hour, severe diarrhea and usually vomiting occur. Larger amounts would produce violent gastro-intestinal irritation and inflammation, which might terminate in death.

Two granules at a time, therefore should never be exceeded, unless experience shows, that, in a particular case, desired effects cannot be produced without increasing the dose. Bile is always present in the evacuations produced by colchicine and, as this remedy is successfully used in the treatment of hepatic congestion, it evidently increases the activity of the liver.

Colchicine not only increases the secretion of the liver, but also of the intestines, skin and kidneys. Its effect is to eliminate urea and uric acid. This clearly demonstrates the usefulness of colchicine in the treatment of gout and rheumatism, which are produced by an accumulation in the blood of uric acid and urea, and by a deposit of these substances in various tissues. In the treatment of gout, colchicine is almost a specific; while in acute, articular rhematism it has proved itself to be as efficacious, in some cases, as salicylic acid if not more so.

In cases of acute gout and in acute rheumatism the treatment is the same. If fever exists, one granule each of aconitine and colchicine should be given every half-hour, or every hour, until the patient is relieved of pain. The dose may then be given every two hours. If the pains are excessive and the patient is robust, two granules may be given every half-hour until the bowels are thoroughly moved.

When vomiting has occurred, or catharsis has been produced, two granules each of colchicine and benzoate of lithium, or benzoate of sodium, should be given every two or three hours. If, however, the patient is delicate it is best not to give the remedy so frequently as to produce diarrhea. In such a case, two granules of colchicine and two of lithium benzoate should be given every two or three hours and, if the bowels then move too freely, the quantity of colchicine should be reduced. Chronic rheumatism has frequently been cured by colchicine, which should be given in combination with bryonin if stiffness of the joints is a prominent feature. Give one or two granules of each every two or three hours but if diarrhea supervenes the dose should be diminished.

In chronic gout, in rheumatic gout and in those affectations which occur because of a gouty or rheumatic diathesis, as gouty and rheumatic headache, gouty and rheumatic neuralgia, and in other complaints of a similar nature, colchicine is an excellent remedy*. In the treatment of these conditions, the best results follow after catharsis has been produced, which may be accomplished by giving two granules of colchicine every half-hour or every hour. This active treatment should be followed by two granules of colchicine and two of benzoate of lithium given every three or four hours, and continued for several weeks until all symptoms of the disease have disappeared.

Two very obstinate cases of sciatica, one of several months' the other of two weeks' duration, yielded to colchicine after many remedies had failed. Two granules were given every two hours until free purgation occurred. Then one granule was given every three hours. Improvement was manifest on the second and third days and the recoveries were complete. In neuralgia of rheumatic origin an equal number of granules of arseniate of quinine, gr. 1-6, should be given in conjunction with colchicine.

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*We have seen the most charming results from the use of colchicine in the pleurisy of those of the rheumatic diathesis, used in combination with aconitine. In the light of present knowledge bryonin should also be added.—PUB.

CHAPTER XIII.

CONVALLAMARIN (GLU.)

Standard granule—Gr. 1-6, gm. .01.
Dose—One every two or three hours as needed.

Convallaria Majalis, or Lily of the Valley, contains two glucosides, convallarin a cathartic, and convallamarin a heart tonic. In order to produce decided results in the treatment of diseases of the heart, it is necessary to give convallamarin in doses of not less than 1-6 of a grain every two or three hours and the amount may be gradually increased to one grain. When the muscular action of the heart is weak or when palpitation is prominent with an irregular, feeble and rapid pulse, whether these symptoms are produced by an organic disease or only by functional derangement, convallamarin is a proper remedy.

In dropsical conditions of cardiac origin, in cardiac dyspnea and in venous stasis from disease of the mitral valves, this remedy is of special value. When convallamarin is administered in these conditions, the heart is strengthened; it beats with more regularity; the blood-pressure is increased; the pulse becomes fuller and stronger and the urinary secretion, in dropsical cases, is greatly augmented. Convallamarin resembles digitalin in its action and is used in all cases where the latter is indicated. The difference between these two remedies is, that convallamarin increases the appetite, while digitalin diminishes it. Convallamarin is a comparatively new remedy and it may be a long time before we can gain the confidence in it that we have in the older, well known and generally reliable remedy, digitalin.

CHAPTER XIV.

COPPER ARSENITE.

Standard Granule—Gr. 1-250, gm. .00025.

Adult dose—One to two granules, as indicated.

Copper arsenite is chiefly used in the treatment of diseases of the gastro-intestinal tract, which have resulted from partaking of unwholesome or of indigestible food. There are large numbers of such cases occurring, especially in summer, among infants as well as adults. Copper arsenite may therefore be prescribed in cases of vomiting, diarrhea and colic, in cholera morbus or in cholera-infantum and in those cases in which pain follows the ingestion of starchy food.

Whenever food, instead of being digested, undergoes fermentation, it produces colicky pains, vomiting and diarrhea.* In the medicinal treatment of these cases, the object is to check fermentation and putrefaction, and to neutralize those products of decomposition already formed and, according to Aulde, to re-establish the functional activity of the cells. One of the best remedies with which to accomplish this is copper arsenite. It usually checks vomiting, pain and diarrhea within a few hours.

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*See article on sulphocarbolate of zinc for the diatetic treatment of these cases.

The action of this salt of copper is similar to the action of sulphocarbolate of zinc, except in its lack of astringency. The taste of zinc sulphocarbolate is unpleasant, and when it is given in doses of two to five grains it frequently produces nausea. Copper arsenite has, therefore, great advantages over zinc in the minuteness and in the tastelessness of the dose. The dose for an adult is one or two granules, each containing gr. 1-250, gm. .00025. The remedy is best given in solution. Twenty-four granules may be dissolved in twenty-four teaspoonfuls of water, and one teaspoonful should be given every fifteen minutes, every half-hour or every hour, according to the severity of the attack.

For infants under one year, four to eight granules, gr. 1-250 each, should be dissolved in twenty-four teaspoonfuls of water, and one teaspoonful should be given every fifteen mintes, every half-hour or every hour. As improvement manifests itself, the same dose may then be given every hour, every two hours or every three hours. For children from one to five years of age, eight to twelve granules, gr. 1-250, should be dissolved in twenty - four teaspoonfuls of water and administered according to the direction given above.

Dr. Aulde, who lately reintroduced this valuable remedy, recommends smaller doses than those given by the writer. The object is not to give the copper in such doses as will produce irritation, and as no harm to the patient has ever occurred in his experience, the writer judges that his doses are not too large.

It should be remembered that the great object of treatment, by means of this remedy, is to prevent further decomposition of the gastro-intestinal contents and to stimulate the secretions of the gastro-intestinal glands. When this is accomplished, the medicine is gradually withdrawn. We are made aware that the remedy is accomplishing its object, when the vomiting, the pain and the diarrhea are gradually subsiding. Herein lies the secret of success with dosimetric medication. When symptoms are severe, remedies are given frequently, in small doses, and are continued until some improvement is manifested. The medicine is then gradually withdrawn. This method of administration reduces to a minimum any risk of overdosing or of poisoning the patient.

When pain follows immediately after the ingestion of food, which indicates stomach indigestion, or several hours after, which indicates intestinal indigestion, arsenite of copper, in doses of two granules, taken before meals, frequently brings relief. The dose for children suffering from stomach or intestinal colic is the same as that recommended in the treatment of diarrhea. Dr. Aulde speaks highly of the administration of gr. 1-100 of copper arsenite in the treatment of seasickness. The dose should be taken before meals.

Various combinations may be made with copper arsenite. If fever is prominent, it may be given with aconitine; if pain is severe, with codeine or hyoscyamine; if there are mucous discharges, or if the stools are green, with emetine; and it should not be forgotten that this is a remedy of exceeding value, being at the same time economical and pleasant.

CHAPTER XV.

DIGITALIN (GLU.)

Standard granule—Digitalin or digitin, gr. 1-67.
Dose—One or two or more every two to four hours.

Digitalis Purpurea, or Foxglove, contains, according to Schmiedeburg, digitonin, digitalin, digitalein, digitoxin and digitin*. Regarding the composition of digitalis, chemists are still at variance. Some assert that all of the active principles which have been separated represent simple bodies and others declare, just as earnestly, that some of them represent compound bodies.

It has not yet been determined by clinical investigation which of these substances is therapeutically the most important. In dosimetry we use two kinds of granules; one contains 1-67 of a grain of amorphous or "German digitalin," composed of digitalein, digitoxin and digitalin, and the other contains 1-67 of a grain of "crystallized digitaline," or digitin.

So long as a feeble and irregular pulse can be made strong and regular by doses of a derivative of digitalis, it is of little consequence whether it is named digitaline or digitalin. The important thing is that the physician should always be able to obtain the same derivative of uniform strength.

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*Of these principles digitonin is to be avoided as it is an irritant. Digitalin and digitoxin are the stronger heart-tonics, while digitalein is a weaker heart-tonic, but more strongly diuretic, therefore the combination of the three in the "digitalin" of the Abbott Alkaloidal Co. is most desirable. This preparation has but to be used to be appreciated.—PUB.

In cases which seem to be particularly suited for its application, digitalis frequently fails to produce any result, hence it should not cause great wonder if one of its active principles fails to cure a patient. Usually some marked results are manifested, if at all, within one week after the treatment has been begun, especially in dropsical cases. If no improvement is observed within that time, some other preparation or some other derivative of digitalis should be tried. If these in turn fail, recourse may be had to convallamarin, cactin or sparteine and each may be given a trial.

Sometimes one of these "heart-tonics" produces a very decided improvement and even a cure when all of the others have failed. Why this particular one should succeed, or what its special indication was, is not at present known. Digitalis, or its active principles, is the most important of all remedies for treating diseases of the heart, and has justly been accorded the first place among the medicines of this class.

A number of newer remedies, lauded by certain enthusiasts, have been pushed forward as of superior value, but digitalis still remains the best, the most reliable and valuable remedy known for the treatment of heart diseases. It is best to change heart-tonics, after they have been given two or three weeks, and substitute one of the above named remedies for one week, returning then to the one first given.

All remedies seem to loose their effect after they have been taken for a certain length of time, unless the dose is increased, and it is better to substitute some drug acting in a similar way than to use large doses*.

Digitalin inhibits or slows the heart's action. By this slowing of the heart's activity, and by the reduction of the number of pulsations, a longer interval of rest is secured, during which the cavities of the heart are more completely filled, the circulation within its walls is improved and the tonicity or contractility of its muscular fibres and of the blood-vessels is increased.

The heart-muscles, therefore, contract with more force and vigor than before. The same rule which applies to all muscles applies also to heart muscles. If a muscle is made to contract more vigorously the muscle grows. So the heart grows under the influence of digitalin, not only in strength but in size and in weight.

Through its action upon the vaso-motor centers, digitalin produces contraction of the muscular fibres of the arterioles and thus diminishes the lumen of the vessels; a greater resistance is thereby offered to the onward flow of blood. The heart, in its effort to overcome this resistance to the blood-stream, produced by the contraction of the arterioles, beats with more vigor and the blood-pressure is raised within the blood-vessels. This rise in the blood pressure is shown when digitalin is administered to patients suffering from dropsy. The pressure within the malpighian bodies is augmented and large quantities of urine are passed. The writer has seen the amount of urine increased from four ounces in twenty-four hours to eighty-four ounces. The increase in the amount of urine may be manifested before the number of pulsations is reduced. Sometimes the number of pulsations is only slightly reduced, or not at all, yet general improvement is manifested, produced by an increase of intra-vascular pressure.

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*By doing this the nerve cells, which have been hard worked under the stimulus of the first drug, and have lost their nervous tone, rest up and will again respond to the action of the first remedy.—PUB.

When from any cause, organic or functional, the number of pulsations is increased, while the pulse is feeble, easily compressed and irregular, when the impulse-beat is imperceptible and the valvular sounds are indistinct, when the impression is conveyed to the mind of the physician that the heart has lost its strength, and as a result the circulation is sluggish, when the kidneys are inactive through want of blood-pressure and dropsical effusion is present in the cellular tissues, the best and the most reliable remedy to correct these conditions is digitalin.

When digitalin is administered to overcome the conditions stated above, the number of pulsations may be reduced from one hundred and twenty or more to the normal, or below the normal. The pulse is no longer weak and irregular but strong and regular. The valvular sounds are clear and distinct. The impression conveyed to the mind of the examiner is not that the heart is pulsating feebly but that it is vigorous in its action. The blood-pressure is greatly increased and the kidneys become wonderfully active which reduces the dropsical effusion.

Unfortunately, digitalin cannot restore all feeble hearts to their former strength and vigor. There are many cases that resist all forms of treatment, gradually grow worse and end fatally. One reason of this failure is, that the nervous system does not respond to the action of digitalin. Some other remedy is needed which can better awaken the depressed nervous energy that is produced by a poor circulation, and this remedy is strychnine. It is of itself a heart-tonic and better results are obtained when digitalin and strychnine are given in combination than when the former is given alone.

In the treatment of diseases of the heart, one or two granules of digitalin may be given every two hours to adults, with two or three granules of arseniate of strychnine. In the treatment of children, the same rule which guides in the administration of aconitine is applicable to digitalin. One granule for each year of the patient's age, together with one additional granule, should be dissolved in twenty-four teaspoonfuls of water. A teaspoonful of the solution should then be given as needed every one or two hours.

When digitalin fails to improve the condition of the patient, excellent results may sometimes be obtained by combining digitalin with convallamarin, sparteine or cactin, even after these remedies have been singly tried and have also failed. Since digitalin is very slow in its action, when a prompt effect is desired, in treating a case of heart disease, caffeine or sparteine should be given hypodermically. In so-called cases of "heart-failure" glonoin, strychnine or atropine are also excellent remedies and produce their effects rapidly; but in shock, when the pulse and respiration are below the normal, the remedy of the greatest value is atropine.

In the treatment of dropsical cases, scillitine and caffeine, given in combination with digitalin, form one of the most potent of diuretics. We should remember, in using this combination, that caffeine not only stimulates the heart but also the epithelium of the uriniferous tubules and these effects of caffeine, together with the diuretic effect of scillitine and the increase of blood-pressure produced by digitalin augment the quantity of urine and thus diminish the dropsical effusion.

Digitalin should only be given in those cases in which the heart beats rapidly and the pulse is feeble; its use is indicated even in the extremest degree of cardiac weakness. But, when the heart beats vigorously, with a strong impulse-beat, or when the pulse is slow, or when it is full and bounding, the administration of digitalin is contra-indicated. Digitalin is also contra-indicated after compensatory hypertrophy has set in. The heart's action, under the influence of this remedy, sometimes becomes so powerful that the pain and jarring produced by the impulse-beat is distressing and it becomes necessary to administer aconitine. The heart has grown too strong and must now be made weaker by means of aconitine. To continue the administration of digitalin under these circumstances would, in all probability, prove fatal.

The physician should never neglect to instruct the patient, who is taking any of the preparations of digitalis, to withdraw the medicine as soon as he feels that the heart is beginning to beat strongly against the chest wall, or as soon as the pulse falls to the normal. This is the period which needs careful watching to prevent the so-called "cumulative action." In palpitation accompanied by feeble and rapid pulse, when indigestion is also present, the mistake is frequently made of believing that palpitation is produced by derangement of the stomach. While this may sometimes be true, especially with patients who partake excessively of coffee or tea, it should not be forgotten that a feeble and sluggish circulation is often the cause of dyspepsia, which can only be cured by improving the condition of the heart.

In typhoid fever, in phthisis and in other diseases of long duration, where the heart naturally becomes degenerated and weak because of continued fever, two granules of digitalin and two of strychnine should be given three times a day. This treatment should be begun at once, in the early stages of the disease, and continued throughout its course. When physicians and nurses are overworked and have lost much sleep, there is frequently produced, upon the slightest effort, palpitation accompanied by vertigo and dyspnea. In cases of this kind, two granules of digitalin and two of strychnine should be administered every three or four hours until the heart becomes stronger.

Besides controlling abnormal action of the heart, digitalin possesses the power of contracting involuntary muscle-fibres. It can be used, therefore, to contract the blood vessels and uterus, and is of special value in the treatment of congestion and of internal and uterine hemorrhages. The writer fails to see, however, of what value digitalis can be in the treatment of post-partum hemorrhage, as recommended by so many authorities. In these cases something must be done quickly, must be done within half an hour, and digitalis cannot produce any effect within so short a time. If post-partum hemorrhage could be anticipated, and if digitalis could be administered in such small doses as not to produce violent uterine contractions for one day before labor began, or even if it were given during labor, some benefit might accrue, but this method is not advised.

In the treatment of post-partum hemorrhage, ergotin is far superior to digitalin, because it acts more quickly and it also can be given hypodermically. It is difficult to comprehend, therefore, why a remedy so slow in its action as digitalis or digitalin should be recommended and used in the the treatment of post-partum hemorrhage, a condition which may be so rapidly fatal.

The best method for treating post partum hemorrhage is the preventive one, which consists in giving three or four granules of strychnine three times a day during the last months of gestation; this will insure a better and more active muscular contraction by toning up the voluntary and involuntary muscular systems*. The preventive method is still further carried out by giving ergotin in large doses immediately after the expulsion of the placenta. In the treatment of hemorrhages which occur as the result of passive congestion, frequently accompanying disease of the mitral valves and dilation of the right ventricle, when the lungs are engorged and the sputum is frothy and bloody and dyspnea is marked, or when metrorrhagia is produced by passive congestion, digitalin is a very useful remedy.

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*One of the promptest reliefs for internal hemorrhage is a physiological dose of atropine administered hypodermically.—PUB.

If digitalin is used in the treatment of internal hemorrhage arising from any cause, it should always be combined with ergotin. One granule of digitalin and six of ergotin should be given every half-hour. If prompt action is desired, these granules should be dissolved and given hypodermically. Whichever method is followed the dose should be repeated every half-hour until the bleeding has ceased, or until the pulse is reduced to the normal. If there is much depression two granules of strychnine should be added to each dose. After the bleeding has ceased the medicine may be given every three or four hours.

Because of the contractile power which digitalin manifests over the arterioles, it has proved to be a very satisfactory remedy when used in the treatment of the cerebral congestion of delirium tremens and of the delirium of acute and chronic mania. Large doses are required and if the heart beats rapidly three or four granules may be given every two hours, watching, of course, its effect upon that organ.

Spermatorrhea accompanied by a weak pulse and other evidences of a poor circulation, when the erections are feeble and the ejaculations are premature, a condition produced by venous congestion, is best treated by giving one granule of digitalin and three of ergotin every two hours. Digitalis possesses undoubted properties as a febrifuge, and is given with excellent results in the treatment of scarlet fever, pneumonia and most acute inflammations.

It should be administered throughout the entire course of scarlet fever, as first suggested by Daniel Lewis of New York; and in case it has not been given, if the urinary secretions become scanty and the pulse feeble or rapid, digitalin and caffeine are now especially indicated.

Digitalin is one of three important constituents used in the preparation of one of the most important granules used in alkaloidal medication, a granule which is given in all asthenic cases when fever is present. The other two remedies, which are combined with digitalin to form one granule, called The Dosimetric Trinity are aconitine and strychnine.

The objection to the use of digitalis, besides the slowness of its action, is that it interferes with digestion and destroys the appetite. This frequently can be prevented, however, if the preparation used is given in combination with nux vomica. This objection does not exist, apparently, against the use of its active principle digitalin. At least, the writer has never observed any trouble of this kind, probably because strychnine or quassin has usually been given by him in combination with digitalin.

The great bugbear which has always haunted the physician when prescribing digitalis it its so-called "cumulative action." This may be developed during the administration of any poisonous medicine. Opium pills have produced more deaths from "cumulation" than has digitalis. If medicines are soluble in the gastric fluid, or if they are administered in solution, and time is allowed for their absorption before other doses are given, and if their administration is stopped when the symptoms abate for which they were given, cumulative action cannot occur*.

Medicines do not circulate in the blood for days in an inactive or dormant state and then suddenly evolve their entire medicinal or poisonous properties within a few seconds; but hard pills may remain undissolved in the stomach for days, when secretious have been scanty and absorption has been slight; and when secretion and absorption are restored, all of the pills may be quickly dissolved and rapidly absorbed into the blood and thus death may be produced.

The following important lessons should therefore be drawn from these facts. Never give pills or granules when the mucous membrane of the mouth is dry, oris covered with sordes, but give the medicine in solution. Never administer medicines by the mouth to comatose patients but always give them hypodermically; and under all conditions, where a prompt and positive effect is desired the hypodermic syringe should be used.

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*This is one of the strongest arguments in favor of the use of the active principles from which cumulative action never comes. The sick stomach is relieved of chemistry, that in its weakened condition it is often unable to perform, because the drug is ready for absorption when taken. Instead of being dangerous the active principles are the very quintessence of safety.—PUB.

CHAPTER XVI.

EMETINE (ALK.)

Standard granule—Gr. 1-67, gm. .001.

Dose—Expectorant, two to four every half to one or two hours. Emetic, five to ten granules in hot solution every ten minutes until effect.

"Emetine is an alkaloid obtained from the root of ipecacuanha and is prepared in granules containing 1-67 of a grain. Emetine was discovered in 1817 by Pelletier and Magendie. The yield is a little more than one per cent."—*Nat. Dispensatory.* In the treatment of acute catarrhal diseases of the respiratory tract, especially in children, ipecacuanha has proved to be a remedy of the greatest value.

In the treatment of bronchitis, a very common disease of childhood, emetine is one of our most reliable remedies. The prominence given to emetine need not surprise us, when we know that it represents the entire medicinal properties of ipecacuanha. It can be prescribed, therefore, in all cases in which ipecac is usually employed. When emetine is given to patients in small doses, gr. 1-67, it increases the secretions of the mucous membranes of the gastro-intestinal and of the respiratory tracts. It should be used, preferably, in the beginning of inflammatory diseases of the mucous membranes of the air passages, as in coryza, pharyngitis, laryngitis, trachitis and bronchitis. At this period the mucous membranes are dry, the secretions are scanty and the cough is harassing and painful. If, under these circumstances, emetine is given in small doses frequently repeated, marked changes are quickly produced. The dryness is soon relieved, the secretions become free, while the cough grows less severe, soft and painless. If fever is present, aconitine should be combined with the emetine, and aconitine may be given in half the usual dose even when fever is not present. The patient improves much more rapidly and no doubt, in many cases, the advent of fever is prevented.

In the treatment of the diseases mentioned above, the following prescription is suitable for a child of one year. Twelve granules of emetine, gr. 1-67, and one or two granules of amorphous aconitine, gr. 1-134, should be dissolved in twenty-four teaspoonfuls of water, and one teaspoonful of this mixture given every half-hour or every hour. As the patient improves the dose should be given every one or every two hours. Two additional granules should be added to the above prescription for each year of the patient's age until the fifth year is reached. Children from five to ten years of age may take one granule, and adults may take two or three granules every half-hour or every hour.

Emetine is a remedy as free from dangerous effects as is ipecac. When given in large medicinal doses, nothing more severe than emesis and purgation can occur, and one or the other of these effects is not only desired but produced as a part of the treatment in certain diseases.

In cases of spasmodic and of membranous croup, in the suffocative stage of capillary bronchitis, in pertussis, in asthma or in any dry, spasmodic cough, and in rigidity of the os uteri, if emetine is administered in large doses every fifteen minutes until nausea or vomiting is produced, relief usually follows. To produce nausea in children under ten years of age, from one to three granules may be given, while to older children and adults, five to ten granules may be given dissolved in hot water. If emetine is given in the above large doses it may produce catharsis, provided emesis can be prevented by the patient's remaining perfectly quiet and sucking small pieces of ice, or by a mustard plaster applied to the epigastrium just before the medicine is taken, or by codeine combined with emetine.

Because of the cathartic action of emetine, it is successfully used in the treatment of acute dysentery. The same dose which causes vomiting, if given at intervals of two hours and guarded by codeine, will produce dark-green bilious-looking stools, after which there is usually a subsidence of the tenesmus and pain. The efficacy of emetine in the treatment of dysentery does not depend upon any specific action beyond its cathartic action, for castor oil, epsom salt and seidlitz salt are remedies which cure dysentery just as quickly as ipecac or emetine. All of the remedies act in a similar manner; they relieve the usually filled and distended colon and reduce the inflammation by draining the congested capillaries.

Emetine is successfully used in the treatment of internal hemorrhages, as hemoptysis, menorrhagia and post-partum hemorrhage. To be effective, however, it must be given in emetic doses every fifteen minutes, until nausea or vomiting is produced. Recurrent pulmonary hemorrhage is frequently prevented by giving ten to fifteen granules of emetine as soon as the first promonitory symptom is manifest. Debility does not contra-indicate its use. The act of emesis does not aggravate the bleeding, as one would naturally suppose, neither is the patient injured by the depression which usually accompanies nausea and vomiting.

Its prompt effect as a hemostatic cannot be explained by any specific action. The general relaxation produced by large doses of emetine permits the blood to flow into remote parts of the body. By this diversion of the blood-stream from the seat of hemorrhage, and by the lowering of the blood-pressure, the bleeding necessarily ceases. If emetine produces relaxation of the voluntary and of the involuntary muscles, as every one must admit, it cannot check bleeding by producing contraction of the arterioles, as is taught by many authorities.

In the summer-diarrhea of teething children, when the stools are green, slimy and bloody, emetine should be freely administered in combination with zinc sulphocarbolate. In gastric catarrh of adults, where large quantities of mucus are vomited, two or three granules of emetine and the same amount of zinc sulphocarbolate given before meals frequently restores digestion by curing the catarrh. Two granules each of emetine and of arseniate of soda is an excellent combination to be used in those cases of dyspepsia in which heaviness or pain is most marked when the stomach is empty.

While large doses of emetine produce vomiting, small doses, half of a granule, will frequently relieve the vomiting of pregnancy. Finally, emetine is a slow but safe emetic to administer when improper food or too much food has been taken, or whenever it is desired to produce vomiting in the young or in the aged.

CHAPTER XVII.

ERGOTIN (AQ. EXT.)

Standard granule—Gr. 1-6, gm. .01. Also in tablets of from one to five grains.

Dose—According to the nature of the case.

Ergotin is a purified aqueous extract of ergot, and is prepared in granules wnich contain one-sixth of a grain. Ergotin may also be obtained in tablets containing one, two, or five grains, which sometimes are more convenient than granules for dispensing and for administration.

Various substances have been obtained from ergot, and as each one was discovered, there was always a hope that this might prove to be the right thing. But, as yet, not one of these substances has unanimously received the distinctive title of the active principle of ergot. At present, ergotin is the purest, the most reliable and stable preparation, and may be used in all cases in which ergot is usually prescribed.

Nearly all authorities recommend the hypodermic injection of ergotin in cases in which ergot is indicated, that is, when prompt effect is desired in dangerous hemorrhages, or where, instead, rapid, more decided and thorough effects are wanted, as in uterine fibroids, subinvolution of the uterus, varicocele and varicose veins. It is surprising that ergotin is not given the preference at all times and not merely when superior results are required.

Ergotin administered during labor produces most decided tetanic contraction of the uterus. This contraction is continuous and so powerful as dangerously to delay parturition, to rupture the uterus or perineum, and to cause the death of the child by compression of the placental circulation, which cuts off its blood supply or produces paralysis of the fœtal heart. Ergotin should never be used during labor, but only after the placenta has been expelled. If administered before expulsion of the placenta, uterine contractions may be so great as to make it very difficult to remove the retained mass. Ergotin is our most valuable preventive of post-partum hemorrhage and should be given immediately after the completion of the third stage of labor, whether bleeding is profuse or scanty. Its use insures a more rapid, permanent uterine contraction.

If post-partum hemorrhage is apprehended, or if the bleeding is severe, it is best to inject five grains of ergotin subcutaneously every half hour until firm contraction is produced.

Digitalin is of no value in this class of cases, because it is too slow in producing its effects. Strychnine is of greater value than digitalin, if it is given hypodermically in doses of one-thirtieth of a grain. If strychnine is taken during the last month of gestation, in doses of four granules, gr. 1-134, each, three times a day, post-partum hemorrhage is not likely to occur.* Ergotin produces contraction of the uterus and of the arteries; not directly, by stimulating the muscular fibres and through the vaso-motor nerves as was formerly believed, but by decreasing the heart's action, by reducing the blood-pressure, by filling the veins and depleting the arteries. According to Schlesinger, Wermick and others, this condition of the arteries, produced as above, results in their passive contraction and by this means the blood in the uterus is diminished, and the anemia thus produced irritates this muscular organ and causes it to contract. This convulsive or spasmodic muscular action is similar to that which occurs in animals that have been bled to death.

It is fortunate for patients that medicines may be administered and cures effected without its being absolutely necessary that the physician should first know the exact *modus operandi* of the remedy. We know that ergotin is our best internal hemostatic, and that it can be used in the treatment of all internal hemorrhages, including cerebral, that it can be used in the treatment of active congestions, and that it will, therefore, relieve congestive headache, delirium of sthenic cases, inflammation and congestion of the brain and cord and of their coverings. In fact, ergotin should be of value in all active congestions and inflammations of all organs and structures.

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*This is a point that should not be lost sight of. With proper diet and the use of strychnine and hyoscyamine we can do much to render labor safe and easy.—PUB .

In the treatment of such cases, from four to six granules, or as much as two or three grains, should be given every hour or every two hours. Uterine fibroids are frequently cured by producing arterial anemia with ergotin. The uterus and blood-vessels contract. This cuts off the blood supply of the growth, which must necessarily atrophy. Sometimes the uterine contractions even expel the fibroid mass. The treatment in these cases is necessarily long. One or two grains of ergotin and three granules of strychnine should be taken four times a day for several months.

Subinvolution, menorrhagia when accompanied by a large, soft, spongy uterus, can be cured by means of ergotin and strychnine. One of the unpleasant effects of ergotin is that it produces contraction of the sphincter vesici, and thus causes retention of urine. In cases of incontinence, therefore, where there is lack of muscular tone, ergotin often effects a cure. This can be more rapidly produced by combining strychnine with ergotin. Diabetis insipidus has frequently been cured by a course of ergot. It was first employed for this purpose by Da Costa. Diabetes mellitus is probably produced by congestion of the glycogenic center in the floor of the fourth ventricle, which produces congestion of the liver. These conditions clearly indicate the use of ergotin, and a reasonable hope of relief may be entertained from its administration in large doses.

In spermatorrhea, where flaccidity of the genitals is marked and the erections are feeble, ergotin and strychnine are the remedies which will restore the lost strength or tone to these organs. According to the latest theory regarding the action of ergot, there seems to exist an antagonism between the action of this remedy and that of digitalis, remedies that are frequently used in combination for the cure of internal hemorrhages. Ergot lowers blood-pressure, while digitalis increases it, ergot produces a passive contraction of the arteries by depleting them and filling the veins with blood;* digitalis produces an active contraction of the arteries by stimulating the vaso-motor centers, and instead of producing venous congestion improves venous circulation.

Whatever the theory, ergot and its derivatives are our best internal hemostatics, being both rapid and effective in their action. Digitalis and its derivatives, in properly selected cases, are synergists, and, when strychnine is added to ergotin and digitalin, a potent combination is formed which may be used successfully to produce contraction of arteries, and of involuntary muscle-fibres, and in this way hemorrhages are not only checked but the desired condition is permanently maintained.

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*For this reason aconitine might well be combined with ergotin to increase its effect.—PUB.

CHAPTER XVIII.

GELSEMININE (ALK.)

Standard granule—Gr. 1-250, gm. .00025.

Dose—One to two granules every half-hour, or every one or two hours according to the effect desired.

GELSEMIN (CON.)

Standard granule—Gr. 1-134, gm. .0005.

Dose—One to two granules every half-hour or every one or two hours.

Gelseminine, also erroneously written gelseminin and gelsemine, is the active principle of gelsemium sempervirens, or yellow jasmine. The yield of the alkaloid, according to Wormley, is 0.2 per cent.

Gelsemin is a concentration, which contains the above alkaloid, as its effects are similar to those produced by the administration of gelseminine.

Whether gelseminine the alkaloid, or gelsemin the concentration is used, it is advisable to adhere to the use of the one, after becoming thoroughly familiar with its action, and not change to the other. Either granule is reliable and will usually produce the effect desired in cases in which this remedy is indicated.

Throughout the south and west gelseminine is chiefly employed because of its efficacy as a febrifuge. In many other parts of our country this remedy is administered particularly in all kinds of neuralgia. If one or two granules of gelseminine are taken every half-hour, by a person in good health, there is soon perceived a feeling of languor and an indisposition to move. The arms and legs feel heavy, the upper eye-lids droop, in spite of all efforts to raise them, and the pupils dilate. When given in large doses it "induces paralysis of both sensation and motion, sometimes of one first, and sometimes of the other; lowers the force and rate of the pulse and respiration; reduces temperature; dilates the pupils; projects the eyeballs but does not suspend the heart's action until the respirations have ceased."—*National Dispensatory.*

In the treatment of many cases in which gelseminine is indicated, it is necessary to produce some slight physiological effect of the medicine before improvement is manifested.

If small doses of gelseminine are given until improvement is manifested or until the first physiological effects of the medicine are experienced, it is then given at greater intervals, poisoning cannot occur.

Gelsemium is regarded as a dangerous remedy, especially when used to reduce fever. This reputation is well-earned because of the large doses of the cruder preparations that are often given. If these preparations are used, they should be given in small doses, frequently repeated. As a result of fatalities from the use of tinctures and fluid extracts of poisonous medicines the following false deduction is made. If crude preparations are dangerous, the active principles of these medicines must be more dangerous.*

Many of the active principles of plants are looked upon by some physicians as a class of medicines which should be left upon the shelves of the chemist as specimens to exhibit the result of his indefatigable research.

With the various crude preparations of gelsemium, as with all other crude forms of medicine, the danger lies in not knowing just how much active principle is contained in a given dose. There may be little or there may be much, according to the conditions under which the plant grew, the circumstances attending its getting and the manipulations through which it has passed. Who but the chemist will undertake to answer how much? There is but one way to reduce this danger to a minimum, and that is to use known qualities of active principles by prescribing the unchangeable, and accurately measured alkaloidal granules.

It may possibly be a hindrance to the use of the active principles according to Burggræve's method, that the physician is compelled to know, at least, the primary physiological effects of the medicines which he uses. When it is necessary to push a remedy, he should also impart this knowledge to his patient. When a patient is given gelseminine he should be told that just as soon as a languid feeling overcomes him and his eyelids grow heavy and droop, the medicine should be taken at greater intervals. When gelseminine is given in full doses, physiological effects are usually manifested within half an hour and continue for at least two hours. When marked effects are felt, it should not be given oftener than every two hours.

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*We desire to emphasize the author's statement of this most manifest error which has stood stupidly in the way of therapeutic advancement so many years.—PUB.

When a patient is fully under the influence of gelseminine he experiences muscular weakness and loss of sensibility to pain. The remedy is indicated, therefore, in all spasmodic contractions of the voluntary and of the involuntary muscles and in painful nervous diseases, neuralgia, neurites, etc. J. N. Freeman considers gelsemium a most valuable remedy. He has given it with success in intermittent fevers of children with involvement of the nervous system; in fevers of dentition, dysentery, infantile rheumatism, convulsions, tetanus of the new-born and meningitis. In cohera he considers it the best of all remedies. In convulsive or spasmodic coughs, as in whooping cough and in asthma, gelsemium is highly recommended by Bartholow.

When good results are thus obtained from the use of crude preparations, better results will follow the use of the active principles and there need be no hesitancy in using them. For the above cases, one, two or three granules of gelseminine may be given to adults every half-hour until some improvement is manifested, or until a feeling of langour is perceived. The dose should then be given every two hours. In treating children observe the aconitine rule*—dissolve in twenty-four teaspoonfuls of water one granule for each year of the patient's age together with one additional granule. A teaspoonful of this solution should be given every hour in acute cases and every two hours in chronic cases.

Besides the effect which gelseminine has in controlling exalted muscular action, it is also of value, as before stated, in relieving exalted sensations, or pain. In neuralgia of the facial nerve, of the sciatic, in ovarian neuralgia and in dysmenorrhea, gelseminine is a remedy of great value. The pains accompanying uterine cancer are often relieved by the use of this alkaloid. Pruritus vulvæ, especially when of nervous origin and pruritus accompanying eczema and urticaria, are benefitted and cured by means of gelseminine. In treating these diseases, two or three granules given every hour will usually be sufficient. If no improvement follows they may be given every half-hour until the eyelids become heavy, after which the two-hour interval should be observed.

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*I desire to emphasize the fact that the author was the first to formulate this rule for the treatment of children and that it is of the greatest importance to have it always clearly in mind.—PUB.

Gelseminine has been used extensively in the treatment of remittent fever, pleurisy, pneumonia and meningitis. It should be used only in sthenic cases, however, because of its depressing power. If strychnine is administered in conjunction with gelseminine, much of its depressant action is lost. Gelseminine is also used to relieve the nagging pain in the beginning of labor, and to check after-pains.

In "dosimetry" we have in aconitine a febrifuge which is vastly superior to gelseminine and free from all danger. Still, if it is desirable to give gelseminine in febrile cases, it may be given every half-hour until improvement is noted, and then every hour or every two hours.

If the action of the lungs and heart is depressed, or, in order to prevent this depression, strychnine and caffeine are the remedies indicated. If the febrifuge qualities of gelseminine are further developed and appear advantageous, a compound granule might well be prepared in which gelseminine, digitalin and strychnine could be combined. All depressing action would then be avoided.

CHAPTER XIX.

GLONOIN.

Standard granule—Gr. 1-250, gm. .00025.

Dose—One granule dissolved on the tongue every five to fifteen minutes until effect and then every half to one or two hours as needed, to maintain the same.

Glonoin, trinitrin and angio-neurosine are all synonyms for nitro-glycerin. In dosimetric medicine it is prepared in granules which contain 1-250 of a grain, gm. .00025. It can also be obtained in a one per cent solution. When one or two granules of glonoin are placed upon the tongue and allowed to dissolve, absorption takes place rapidly. Within five minutes, usually, the heart beats more forcibly and quickly, the head feels full and there is a throbbing in the temples; the face grows hot and flushed, while drowsiness and languor often follow.

When larger doses have been administered, or when small doses have been given to susceptible patients, severe, throbbing headache, vertigo, nausea, weak pulse and even unconsciousness sometimes occur.

Nitro-glycerin is an extremely useful and potent remedy and it is not so dangerous to use as might be inferred from its name. Except in cases of emergency, when one or two granules may be crushed and dissolved on the tongue every five minutes until effect, it is safest to begin with doses of one granule, or with one-half drop of the one per cent solution. The dose may be gradually increased and repeated every fifteen to thirty minutes until some marked physiological effect is produced. When the proper dose for the individual is ascertained, it should be repeated, to keep up the impression, every half to one hour.

The effects of glonoin are not lasting, and usually pass away within an hour. Good results do not follow the use of this remedy, unless flushing of the face, fullness of the head, or increase of the heart's action is produced. In cases of emergency, where death seems impending four granules dissolved in hot water, or in hot whiskey, or two drops of a one per cent solution should be injected hypodermically, and this may be repeated every fifteen to thirty minutes until some improvement is observed.

The most alarming symptoms produced by taking glonoin are quickly recovered from, without bad or lasting effect. It is doubtful if death has ever been produced by the internal administration of medicinal doses of this remedy.

Physiologically, glonoin acts only upon the vaso-motor centers and produces dilatation of the arterioles in all parts of the body, an effect which is especially manifested by marked redness of the face. The indications for its use, therefore, are not difficult to comprehend; and the best results are obtained in diseases in which paleness of the face, coldness and clamminess of the general cutaneous surface are present.

During a paroxysm of renal, hepatic, uterine, stomachic or intestinal colic, the face is pale and the skin is cold and moist. The arterioles of the integument are contracted and those in the organ or structure involved may also be contracted.

If this is the case, capillary anemia results and it is well-known that sudden anemia produces pain and spasmodic contractions of muscular tissue. On the other hand, the arterioles in the organ and structures involved may be dilated, and congestion of the part ensue, while the arterioles in all other parts of the body are contracted. Nitro-glycerin, given under these circumstances, by its action upon the vaso-motor centers, overcomes the contraction of the arterioles, wherever it exists, and the previously anemic capillaries are distended with blood.

It cannot always be apparent whether the congestive, or the anemic condition is the cause or the result of the pain, but this fact remains; that if the remote capillaries are filled with blood, and the circulation in the structure involved is restored to the normal, the pain is relieved, which shows, at least, that some disturbance of the blood-supply was the cause of the pain.

A very common and severe pain, which is

most frequently produced by congestion, is dysmenorrhea. Throbbing, aching and pricking sensations in the womb are complained of, previous to or during the first hours of menstruation. Degeneration and exfoliation of the uterine mucous membrane proceeds slowly. The distended or congested capillaries cannot disgorge themselves when covered by this firmly organized membrane as they can later, when covered by one that is softening, breaking down, and desquamating. The object of treatment in these cases is to relieve the uterine and ovarian congestion by diverting the blood to other parts of the body, and this can be accomplished by administering one granule of glonoin every half-hour until fullness of the head or flushing of the face is produced, after which one granule may be given every hour or every two hours. Nitroglycerin (glonoin) may be employed for this purpose every month, without resulting in any harm to the patient.

That most dreaded disease, angina pectoris, which in its true form is accompanied by pallor, is, fortunately, very often relieved by dissolving two granules of glonoin in the mouth, or by giving the same dose subcutaneously every fifteen minutes.

In the treatment of all diseases of the heart, where feebleness of its action is particularly marked, as in fatty degeneration or in dilatation, the circulation in remote parts is improved, the heart is relieved of undue pressure, and is stimulated to increased activity by the administration of nitro-glycerin. In all cases of syncope, and in so-called heart-failure, which occur, frequently in pneumonia, typhoid fever, hemorrhage and in diarrhea, glonoin, hypodermically given, is undoubtedly our most efficient remedy. It often restores life when all indications seemingly point to dissolution.

For these cases, one or two drops of a one per cent solution, or three or four granules dissolved in hot water, may be injected every fifteen minutes, until there is some evidence of recovery.

No physician should be without glonoin in his emergency case. There is no remedy which can be used in the treatment of collapse that is so quick and sure in its action. Paroxysms of asthma, especially when the expectoration is scanty, migraine, facial neuralgia, hiccough, sea-sickness, reflex, vomiting, toothache, vertigo and tinnitus aurium are reported by various authorities as having been cured by the use of nitro-glycerin.

In the cases last mentioned, if the face is flushed relief does not usually follow the use of this remedy, but when the face is pale good results may be expected.

The therapeutic value of glonoin depends upon its power to relax the small arteries and flush the cutaneous capillaries. If they are already distended with blood, the remedy is of no value. One granule should be administered every half-hour until headache or throbbing in the temple is produced; the dose may then be given every two hours. A number of physicians have reported cases of asphyxia, resulting from inhalation of illuminating gas, in which recovery speedily followed hypodermic injections of 1-50 of a grain of nitro-glycerin.*

This remedy should be used, therefore, in all cases of asphyxia, in asphyxia of the new born, in cases of drowning, hanging, also in narcosis produced by ether or chloroform. The congestive stage of malarial fever or of any inflammatory disease may be aborted by means of this remedy. Nitro-glycerin is undoubtedly the most rapid and reliable divertant of the blood-pressure known, and should therefore be more extensively used in the treatment of acute and chronic inflammations, for, by distributing the blood to remote parts and equalizing the blood-pressure, the diseased structure is relieved of its congestion and cure must frequently follow.

This remedy should always be used in the treatment of acute and chronic Bright's disease. It is of especial value when the pulse is hard and firm and the arteries are small and narrow. Glonoin overcomes the capillary constriction, giving a better circulation through the peripheral vessels, and restores the circulation within the kidneys to the normal state. Wonderful results have been produced by its use in this disease. It should be given in two granule doses every three hours. Its effect should be carefully watched and, if physiological manifestations are not produced, the dose should be carefully increased.

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*We can vouch for this observation, having used it successfully in several cases.—PUB.

Bartholow advocates the use of nitro-glycerin in the treatment of anemia. It improves the circulation in remote structures and increases the energy of the heart. There is no doubt that in many cases anemia results from inadequate circulation of the blood because of feeble action of the heart. Many diseases, concomitant with feeble cardiac movement, have their origin in poor circulation through some one of the organs. These diseases cannot be treated through that organ but only by improving the condition of the heart. So it is with anemia, better results may be obtained in many cases by giving heart-tonics or heart stimulants than by giving preparations of iron.

CHAPTER XX.

HYOSCYAMINE AND HYOSCINE (ALK.)

Standard granule—Amorphous hyoscyamine, gr. 1-250, gm. .00025; crystalline, hyoscyamine, gr. 1-1000, gm. .0000625; hyoscine hydrobromate, gr. 1-1000, gm. .0000625.

Dose—Of either, one or two granules every one-quarter to one-half or one hour till effect and then as needed to maintain the same.

The seeds, leaves and flowering tops of hyoscyamus niger contain the alkaloids hyoscyamine and hyoscine. "The dried seeds yield from 0.08 to 0.16 per cent and the leaves 0.042 to 0.224 per cent of hyoscyamine."—*National Dispensatory*. There are two forms of hyoscyamine, the amorphous* and the crystalline. The former is prepared in granules containing 1-250 of a grain, gm. .00025, and the latter in granules containing 1-1000 of a grain, gm. .0000625.

The writer uses only the amorphous from which he obtains full physiological effects. Hyoscine, as an alkaloid, is seldom used, the preference being given to its salt, the hydrobromate, which is prepared in granules containing 1-1000 of a grain, gm. .0000625.

When hyoscyamine is taken in doses of one or two granules every half-hour, there is soon perceived dryness of the mouth and throat, dilatation of the pupils, increase of the number of pulsations and respirations, and redness of the face. If the dose should be continued after these effects are noted, delirium, illusions and hallucinations would occur. Hyoscyamine acts upon the sympathetic nervous system, and when dosimetrically prescribed (that is, in small doses) it stimulates the vaso-motor centers and increases the arterial tension. Larger doses produce opposite effects.* Hyoscine and hyoscyamine are similar in their action, and may be used interchangeably. Hyoscine is more powerful and is more likely to produce delirium. It should always be used in smaller doses than hyoscyamine.

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*The amorphous hyoscyamine is to be preferred for ordinary use, as it contains not only hyoscyamine but hyoscine also.—PUB.

Atropine and hyoscyamine are, physiologically, and therapeutically, similar in their action and may be used in the treatment of the same class of diseases. Hyoscyamine has one decided advantage over atropine, in that it possesses greater hypnotic properties. It is, therefore, used in cases of acute and chronic mania, in delirium tremens and in fevers, when accompanied by great mental excitement. As the mental excitation of the insane is one of its chief indications, this remedy has been extensively used by those specialists who have charge of this unfortunate class of patients. Prideaux declares "that it is the most reliable narcotic we possess."

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*Notice here again the dual action of the drugs of this class and do not wonder at the conflicting reports given.—PUB.

Coleman and Taylor say that, "hyoscyamine never fails to act as a prompt and powerful sedative in cases of mental excitement, and that no bad after-effects follow."

Hyoscyamine, in doses of 1-120 to 1-60 of a grain, was found by Lemoine "to be a safer, more certain and more efficient hypnotic, in acute mania, than hyoscine in similar cases." Kobert regards "hyoscine as a feeble narcotic for healthy men. In mental diseases, on the other hand, it acts so powerfully that no remedy can rival it." The great weight of authority seems to be in favor of the use of hyoscyamine, in preference to that of hyoscine.

Both of these alkaloids may be given hypodermically, and they then produce their effects very rapidly. Sleep usually follows within ten or fifteen minutes when hypnotic doses have been given. In order to produce sleep, it is better to give one large dose than several smaller doses; 1-125 of a grain should never be exceeded as an initial dose, because of the peculiar susceptibility shown by some patients to the influence of this drug. This may be repeated within half an hour and may be gradually increased day by day until 1-60 of a grain has been given at a single dose. Some physicians have given as much as 1-10 of a grain with no bad results.*

Large doses should not be given unless it has been found that smaller doses are without effect. The object should be, always, to obtain results with as small a quantity of medicine as possible, and not to see what large amounts patients can take without being poisoned. Hyoscyamine is comparatively a harmless remedy when given in medicinal doses, and, when given according to the rules laid down by Professor Burggræve, no harm can possibly result from its use. Unpleasant symptoms, which have resulted from large doses, such as dizziness, muscular weakness and delirium, fortunately, have rapidly and completely subsided.

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*In cases of this character we should question the quality of the drug used.—PUB.

In all spasmodic affections of the involuntary muscles, as asthma, laryngismus stridulus, enteralgia, uterine, vesical, renal and biliary colic, and in recent hernia, one granule of hyoscyamine dissolved in hot water and given every fifteen minutes will usually relieve pain and muscular spasm after several doses have been taken. The administration of this remedy may be persisted in until the pupils are dilated or until the mouth becomes dry. If the patient has derived no benefit by this time, hyoscyamine is powerless to afford relief in this case.

Burggræve particularly emphasizes the usefulness of hyoscyamine as an aid in the reduction of hernia, after taxis has failed. Dr. W. C. Abbott reported a case in May, 1894, of a large scrotal hernia which could not be reduced by taxis, but was quickly restored after the patient was under the influence of hyoscyamine. In all spasmodic coughs, hyoscyamine usually proves to be an excellent remedy. It may be combined with codeine, lobelin or emetine. In cases of irritable bladder, in which there is bearing or squeezing pain after micturition, this remedy acts as a sedative to the urinary tract. In the tenesmus of dysentery, hyoscyamine often relieves the pain and straining of this disease. Two or three granules given at bedtime frequently prevent the night-sweats which accompany phthisis and other exhausting disorders.

As an adjunct to cathartics, hyoscyamine is of value, since it prevents the griping which this class of remedies usually produces. In affections of the nervous system, in which the voluntary muscles are abnormally influenced to excessive action, as in paralysis agitans, palsy, senile trembling, hydrophobia, tetanus, and even in mercurial tremor, hyoscyamine, according to Charcot and Oulmont, either works a cure or affords relief.

Hyoscyamine is a very useful remedy in treating the diseases of children, and may be used successfully to allay spasms, to soothe fretting and cross infants who are suffering from teething and, especially, to quiet those colicky children who cry almost constantly. Children bear hyoscyamine better than they do most alkaloids and require larger proportional doses.

The rule for the administration of aconitine will not do in the case of hyoscyamine, for children require just twice as many granules of hyoscyamine, gr. 1-250, as of aconitine, gr. 1-134. The following rules applies to the administration of this drug.

Infants from one to three months old require one granule dissolved in twenty-four teaspoonfuls of water.

Infants from three to six months old require two granules dissolved in twenty-four teaspoonfuls of water.

Infants from six to nine months old require three granules dissolved in twenty-four teaspoonfuls of water.

Infants from nine to twelve months old require four granules dissolved in twenty-four teaspoonfuls of water.

A child of two years requires six granules dissolved in twenty-four teaspoonfuls of water.

A child of four years requires ten granules dissolved in twenty-four teaspoonfuls of water.

For children twelve years old and upwards, and for adults, one granule of hyoscyamine is the dose. In prescribing for older patients, the doses may be given as frequently as every fifteen minutes, but for young children every half-hour or every hour will be often enough.

CHAPTER XXI.

LOBELIN (CON.)

Standard granule—Gr. 1-12, gm. .005.
Dose—Two to three every one-half to one hour.

Lobelin is the active principle of lobelia inflata or Indian tobacco, and is prepared in granules containing gr. 1-12, gm. .0005. When lobelin is given in large doses it acts as a powerful emetic and so great is the accompanying depression that it should never be administered for this purpose to weak or delicate individuals. In all dry, spasmodic coughs and in asthma, two or three granules administered every half-hour, or every hour, soon overcome the spasm and produce free expectoration.

In severe attacks of spasmodic asthma, the remedy should be persisted in until relief or nausea is produced. The general muscular relaxation which follows large doses, or frequently repeated small ones, is often utilized to relieve strangulated hernia.

CHAPTER XXII

MERCURY BICHLORIDE AND CALOMEL.

Standard granules—Calomel, gr. 1-6, gm. .01, and gr. 1-67, gm. .001. Bichloride, gr. 1-134, gm. .0005.

Dose—According to the result deisred. See text.

Of the many preparations of mercury that are medicinally used, the therapeutical properties of only two will be here mentioned. All the preparations are of more or less value as therapeutical agents, but the representative mercurials are calomel and the bichloride. The chief objection that may be urged against the administration of mercurials is the danger of producing salivation; and this danger should always be remembered when prescribing any of these remedies. Some individuals possess a peculiar susceptibility to the action of mercurials, and manifest symptoms of poisoning after taking a small amount of the medicine; a single dose of calomel has produced marked ptyalism.

As salivation does not usually manifest itself until several days after the administration of the mercurial, there is, of course, no opportunity to withdraw the treatment in those cases where it is necessary to maintain it only for a few hours.

Great caution is, therefore, necessary when administering calomel to a very delicate patient.

Mercury is eliminated from the blood by the kidneys, the pancreas, the intestinal glands and the salivary glands. Very little harm usually results when mercury is eliminated by the first three structures; but, when the salivary glands are very active in its removal, stomatitis may be produced by the presence of mercury in the saliva. If, therefore, the function of the salivary gland can be checked for a time by the use of atropine, as suggested by Bartholow, salivation may be prevented. Hence, while calomel is probably the best intestinal antiseptic, its use must be restricted, and its action must be carefully watched because of its liability to produce salivation.

In derangements of the gastro-intestinal canal, especially in cholera infantum and in summer diarrhea of children caused by the presence of decomposing food, which by its irritation produces vomiting, pain and diarrhea, the remedy that will most effectually evacuate the intestines and render them aseptic is calomel. In vomiting, especially where the stomach is very irritable, relief is frequently obtained by giving small doses of calomel. Two or three granules, gr. 1-67, should be administered to an adult every half-hour, while one granule (which should be crushed) may be given to children one year old. When vomiting is checked the medicine should be discontinued.

In the treatment of diarrhea in adults, four granules, gr. 1-67, should be given every half-hour and, for children from one to three years old, one granule, until the character of the stools is changed. The calomel should then be withdrawn and sulphocarbolate of zinc administered until the patient is well.

In the treatment of typhoid fever this remedy is almost a specific. In whatever period of the disease the patient is first seen, whether at the beginning of the attack, or at any subsequent time, whether diarrhea or constipation exists, the first medicine to be prescribed is calomel. In every case in which this remedy has been used by the writer, the fever declined and the patient's condition improved. If fever returned the same treatment was again given.

In administering calomel in the treatment of typhoid fever it should always be combined with bicarbonate of soda. A tablet containing 1-10 of a grain of calomel and two grains of bicarbonate of soda is a very convenient form. If tablets are not at hand, a teaspoonful of the soda should be dissolved in a glassful of water and a swallow of this solution should be taken with each dose of the granules. The dose for an adult is six granules, gr. 1-67, or one of the tablets, and should be given every half-hour, until the stools are changed from their characteristic appearance of pea-soup, to a darker color. With this change in the color of the stool, the fever diminishes and rarely returns to the height it had reached at the time the calomel treatment was begun. Whether we adhere to the theory that calomel checks or to the opposing theory that it increases the secretion of bile is not of so much importance as a knowledge of the fact that when calomel is properly administered in typhoid fever the condition of the patient is wonderfully improved.

In the stools produced by calomel, bile is certainly present, no matter which theory may be correct, and two of its functions, the increase of peristalsis and the prevention of decomposition, are performed during its passage through the intestines. Similar properties, with an additional one, that of increasing the intestinal secretions, belong to calomel. A union of bile and calomel, therefore, forms a powerful antiseptic cathartic, which not only empties the intestinal tract of decomposing fecal matter, but also checks fermentation, and prevents further absorption of septic material.

The calomel treatment, in cases of typhoid fever, should be followed by the administration of zinc sulphocarbolate. The administration of soda is supposed to render the patient less liable to salivation. The treatment of typhoid fever just outlined has been used by the writer very extensively, for several years, and in no case has salivation been observed. The only precaution used to prevent this danger, was the combination of soda with calomel, and the withdrawal of the remedy as soon as darker stools were produced.

The only explanation which can be offered why salivation is not produced in cases of typhoid fever is, that the salivary secretion is diminished because of the accompanying fever, while the intestinal secretion is increased, as shown by the almost invariable presence of diarrhea. The more active intestinal glands take upon themselves the elimination of what mercury is absorbed, and thus relieve the salivary glands. When calomel is given to a patient who has diarrhea, the frequent evacuations do not allow the medicine to remain long within the intestines; only a limited amount, therefore, can be absorbed, and in this way salivation is prevented.

In the treatment of inflammatory croup and diphtheria, one granule, containing 1-6 of a grain of calomel, should be administered every half-hour, to a child from three to five years of age, until the stools become of a darker brown or green color. Good results rarely follow the administration of calomel, unless the stool shows evidence of an impression made upon the intestines. Whether it produces any effect upon the liver or not is still a matter of dispute, but a so-called "bilious stool," produced in these diseases, is usually followed by a reduction of the inflammation which produces the dyspnea.

Dropsical effusions are sometimes absorbed with astonishing rapidity through the diuretic action of calomel, but the remedy must be given in larger doses than those prepared in dosimetric granules. The method generally followed is to give three grains each of calomel and bicarbonate of soda, three times a day for three days. Diarrhea may be guarded against by codeine, while ptyalism may be prevented by atropine as suggested by Bartholow, and above referred to.

On the third or fourth day from the beginning of the treatment, if calomel has been effective, the kidneys manifest a wonderful activity, which quickly reduces the dropsy by the daily passage of ten or twelve pints of urine. Sometimes calomel fails, especially where the kidneys have undergone marked pathological changes.

MERCURY BICHLORIDE.

Our most powerful germicide is bichloride of mercury. It is the most important remedy in the treatment of that dreaded disease, syphilis. In the treatment of the secondary form of this disease it is a specific. Two or three granules may be given every three or four hours, until the gums become slightly tender, which can be discovered by the patient's biting upon his teeth. Patients should practise this biting frequently and, as soon as tenderness is observed, the granules should be taken only two or three times daily, or entirely withdrawn for a few days if salivation is produced.

In order to cure syphilis, it may be necessary to continue the mercurial treatment for months, sometimes for a year. Salivation should be prevented, if possible, but it seems to be necessary that the gums should feel slightly the influence of the medicine before marked results can be produced. If salivation occurs, it is best treated by the internal administration of atropine and by a local wash made of chlorate of potassium.

CHAPTER XXIII.

MORPHINE AND CODEINE (ALK.)

Standard granules—See text.
Dose—According to effect desired.

Morphine and codeine are two of the many alkaloids of opium. Morphine is the principal alkaloid, and is used more extensively than all of the others combined. Of these two remedies, the more active is morphine. One-fourth of a grain of morphine is therapeutically equivalent to one grain of codeine.

The following preparations are found in the alkaloidal granule lists. Morphine hydrobromate, gr. 1-67; morphine muriate, gr. 1-12 and gr. 1-67; morphine sulphate, gr. 1-12 and gr. 1-67; and codeine sulphate, gr. 1-6 and gr. 1-67.

The principal indication for the use of opiates is pain. If opium and its derivatives were used only to relieve pain, they would still, probably, be more widely useful in their application than any other remedy. Fortunately, opiates, the best and most important of all remedies, are not only anodynes but have other important properties.

They are chief among narcotics or hypnotics and produce quiet sleep where there is great excitement and restlessness. Their application is invaluable in the treatment of many nervous diseases.

In the treatment of internal hemorrhages they allay all anxiety and quiet the excited heart. As antispasmodics they relieve asthma, paroxysms of coughing, angina pectoris, tenesmus or muscular spasms and colic. They act upon the secretions and are, therefore, important remedies in checking diarrhea, excessive mucous discharges and the increased flow of urine in diabetes.

From these indications for their use it would appear that the application of opiates is almost unlimited. Unfortunately, a means of great good is only too often a means of great evil, and this double function is performed coincidently. The step from good to evil is thus unobserved. The possibility, no! the probability, of this step should never be lost sight of.

While opiates have relieved much pain and saved the lives of thousands, they have been the cause of untold sorrow and anguish, and of the wreck and destruction of innumerable lives. The physician has, only too often, thoughtlessly and innocently initiated the victim into the terribly deplorable life of the opium taker.

Opium, administered during physical or mental suffering, produces a feeling of ease, relief and mental comfort; the brain is stimulated and the thoughts flow freely; suffering and anguish are things of the past, whose return seems impossible. It is doubly deplorable when the physician himself learns of the seductive charms of this useful but dangerous remedy. He knows of its power in affording relief, and without one thought as to its consequences, takes dose after dose, apparently never realizing that he has become a victim to the habit.

This is the history of hundreds of physicians, whose usefulness in the medical world is totally destroyed. When the pleasant effects of opiates have passed away, and its narcotic effect is no longer felt, there frequently follows a train of disagreeable symptoms, as nausea, vomiting, dryness of the tongue, vertigo, headache and general depression. To prevent these after-effects, atropine is usually combined with opiates.

Codeine is very much milder in its action than morphine, and rarely produces subsequent disagreeable symptoms, while its therapeutical properties are similar to those of morphine. It is the only derivative from opium which should be used in the treatment of children, and in the treatment of adults it should be more frequently employed. It ought to be better understood, and more fully appreciated than it is; so far as is at present known, the taking of codeine does not lead to its habitual use.

In nearly all cases where morphine is indicated, codeine may be used as a substitute. In the treatment of all painful diseases of the gastro-intestinal canal, as colic, peritonitis, dysentery diarrhea and cholera morbus, codeine is superior to other opiates. The anodyne effect of codeine can be increased by the addition of hyoscyamine. When the pain is severe, three granules of codeine, gr. 1-6, and one granule of hyoscyamine amorphous, gr. 1-250, should be given every half-hour until there is relief; the dose may then be given, if required, every one or two hours.

If diarrhea is present, three granules of sulphocarbolate of zinc, gr. 1-6, and three granules of codeine, gr. 1-6, or a tablet containing codeine and zinc, aa gr. 1-2, may be given every half-hour, until improvement is marked.* A dose should then be taken after each stool.

This combination of codeine and zinc is probably the best prescription for diarrhea arising from any cause. In entero-colitis, accompanied by soreness or pain, with frequent, mucous and blood-stained discharges, codeine and emetine in combination frequently effect a cure.

When pain follows the ingestion of food, two or three granules of codeine, gr. 1-6, taken one-half hour before eating, afford marked relief. Neuralgia of all kinds is quickly relieved by a hypodermic injection of 1-6 of a grain of morphine combined with 1-120 of a grain of atropine. In the treatment of distressing coughs, especially in the aged, few remedies can be compared with codeine in affording prompt relief. One, two or three granules, gr. 1-6, may be given every half-hour. The dose may be increased if found necessary, or may be combined with one of the following expectorants, emetine, apomorphine, calcium sulphide, lobelin or scillitin.

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*Since the above was written a tablet has been devised with the approval of Dr. Shaller, that more clearly meets the indications present in these cases. Each contains zinc sulpho-carbolate, gr. 1; codeine sulphate, gr. 1-4; hyoscyamine amorphous, gr. 1-250; with strychnine sulphate, gr. 1-134. This is made by The Abbott Alkaloidal Company and is known as "Zinc and Codeine Compound." It is a most excellent combination and one having a wide range of usefulness.—PUB,

Morphine should never be prescribed in the treatment of dysmenorrhea or ovarian pains, because of the great danger of creating the morphine habit. A remedy free from this danger, as we have shown above, and at the same time equally efficacious, is codeine, which, when given in conjunction with hyoscyamine or with macrotin, if the menstrual flow is scanty, forms an anodyne of great usefulness. In painful diseases of the bladder, also, codeine and hyoscyamine form a combination which gives excellent results.

The slow solubility of codeine (except the phosphate) is one reason why it has not been more frequently employed for hypodermic medication. Preference is therefore given to morphine on this account, for hypodermic use, and also, no doubt, because morphine relieves neuralgia and pain generally, except pain in the abdominal organs, more effectively than does codeine.

The physician is always desirious to relieve pain. It is usually such an easy thing to do, and, in his anxiety to give relief quickly, he administers larger doses and more frequently than is required.

When prescribing opiates in chronic diseases, especially when the patient is of a nervous type, the danger of the opium habit, with all of its terrible consequences, should be ever prominently present in the mind of the physician. On account of the different effects of morphine upon different individuals, 1-6 of a grain, given hypodermically, should rarely be exceeded for the first dose. If relief is not manifest within twenty minutes, the dose may be repeated. When prompt relief from pain is desired, the hypodermic method should be employed, particularly if persistent vomiting is present, which interferes with the retention and absorption of the medicine.

The usual dose of morphine, hypodermically, is one-sixth to one-fourth of a grain, and this may be repeated several times at intervals of fifteen to thirty minutes. It should be remembered that one-half of a grain is the smallest dose of morphine known to have caused death in an adult. Morphine and atropine are physiological antagonists. The former contracts the pupil while the latter dilates it. In a case of poisoning by either medicine, the other is used as an antidote, but only so far, however, as to overcome the condition of the pupil. In opium or morphine narcosis, only small doses of atropine, 1-100 of a grain, should be given, and this not more than two or three times at intervals of half an hour.

The object is not to overcome narcosis and to awaken the patient, for if this should be attempted by large and frequently repeated doses of atropine, only a deeper sleep would result. If the contracted pupil relaxes and the pulse and respiration are restored to a normal ratio, atropine has done all it can possibly do. In conjunction with atropine, codeine may be administered hypodermically, in doses of one-fourth to one-half grain, and the injection repeated two or three times at intervals of half an hour or an hour.

Prescribing opiates for children is always hazardous. As a rule they bear the drug badly; they are more susceptible to its evil influences than they are to those of any other medicine. There is not the same certainty in calculating the proper dose of an opiate for children, which shall be entirely free from danger, as in calculating doses of other poisonous drugs. Again, idiosyncrasies exist to a greater extent than among adults. For these reasons, the mildest of the derivatives of opium, that which possesses the fewest objectionable features and is freest from danger, should always be used when prescribing for children. The alkaloid which possesses all of these qualities, and is equal to morphine in many respects, while superior to it in others, is codeine.

Opium and morphine should never be prescribed for infants. Codeine is the remedy when an anodyne is indicated. The diseases which probably require opiates more frequently than any other class are those of the gastro-intestinal canal; the pain is usually severe and the patient should have immediate relief.

Gastro-intestinal pains are most frequently produced by the presence of indigestible food, which by fermenting evolves gases and produces irritating acids. Naturally, the best method for treating such conditions, instead of giving opiates to relieve pain, the result of which is to check peristalsis and to lock up decomposing material within the bowels, is to evacuate the canal.

This can be accomplished by giving an emetic, as emetine or apomorphine, and a cathartic, as calomel or Abbott's effervescent seidlitz salt. This should be followed by the administration of zinc sulphocarbolate.

If the pain persists, and inflammation is not present, spirits of camphor or monobromated camphor may be given in hot milk, or hyoscyamine, which is an excellent anodyne, may be given in solution to children and in granules to adults. If colicky pains are of daily or almost of continuous occurrence with infants, there is usually something wrong with the diet; this should be corrected, and pepsin, diastase or papoid given with each meal. Opiates should not be used, as they only afford temporary relief, check secretions and produce constipation.

When, however, it is absolutely necessary to give opiates, let it be, as indicated above, codeine combined with hyoscyamine. After making several attempts to find a proper dose for a colicky baby of four weeks, who was crying all day and all night, the writer found that the following prescriptions gave prompt relief: In a three-ounce vial of water, there were dissolved five granules of codeine, gr. 1-67, and two granules of hyoscyamine amorphous, gr. 1-250, with some saccharine. A teaspoonful was given every half-hour and after one or two doses, quiet usually reigned.

While frequent administration of opiates in small doses may not always give such prompt relief as a single large dose, the element of danger is eliminated, and only so much of the medicine given as is necessary to relieve the pain. In this way, too, the bad after-effects, which are produced when larger doses are given, are avoided. It frequently requires several days for the nausea, vertigo and foul breath to disappear, after a large "heroic" dose has been administered.

CHAPTER XXIV.

PILOCARPINE (ALK.)

Standard granule—Of the nitrate, gr. 1-67, gm. .001.
Dose—Two to six granules every one or two hours.

Jaborandi contains two alkaloids, pilocarpine and jaborine. While both these principles are obtained from the leaflets of jaborandi, they are, therapeutically, as antagonistic as it is possible for two medicines to be.

When jaborandi is administered to a patient, it usually produces copious sweating and salivation. In case it fails to produce these results, the preparation used must have contained an unusual amount of jaborine, which has an action similar to that of atropine and, therefore, antagonizes pilocarpine. In order to reduce the number of such failures to a minimum, the various preparations of jaborandi should be replaced by the alkaloid, pilocarpine.

When pilocarpine is injected subcutaneously, there is usually produced, within five minutes, vertigo and flushing of the face, neck and breast, which is followed by paleness. Drops of sweat make their appearance, first around the seat of injection, then upon the forehead, and gradually over the entire body. Saliva flows in a constant stream from the mouth, tears run down the cheeks and the secretions of the entire respiratory and alimentary tracts, and particularly of the pancreas, are augmented; the pupils are contracted; the heart and lungs perform their functions more rapidly; the pulsations sometimes increase from twenty to fifty beats; the blood-pressure is lowered and the temperature falls from one-half to two degrees. The effects of pilocarpine last about four hours, and as much as two pints of saliva may be secreted and more than twice this amount of perspiration.

Naturally, after a copious sweat and a loss of other secretions, with depression of the heart's action and fall of body-temperature, there must follow chilliness, fatigue, drowsiness, great weakness and depression. These facts should always be prominent in the mind of the physician, when administering pilocarpine to weak and delicate patients.

If pilocarpine fails to act upon the skin and salivary glands, it may act with unusual vigor either upon the kidneys, the stomach, the intestines or the lungs. If this is the case, large quantities of urine may be excreted; thick ropy mucus may be vomited; profuse diarrhea may be produced or frothy mucus may be continually expectorated.

From the effect of pilocarpine upon the lungs, serious results may be anticipated, especially when they have undergone marked pathological changes. Bronchial mucus is formed in such large quantities as greatly to embarrass the weakened lungs in their effort to expel it; sometimes they are unable to do so and death ensues. This remedy is contra-indicated, therefore, where the lungs are weak or diseased, also where the pulse is rapid or feeble and the heart has lost its vigor and tone, and finally in gastro-intestinal irritation and inflammation.

By its action upon the glandular system, pilocarpine proves itself to be a very active evacuant. Under favorable circumstances, it can eliminate from the body from two to six pints of fluid. It may be used, therefore, in all cases of dropsy, as anasarca, hydro-thorax, hydropericardium, and ascites. When disease of the kidneys is the cause of the dropsical effusion and where the heart is strong, a reduction of the effused fluid is most rapidly produced by the administration of pilocarpine.

To see a patient fully under the influence of pilocarpine, is to see an extremely uncomfortable and wretched individual. The eyes are red and tears are streaming down the cheeks; a thin mucus is dripping constantly from the nose; saliva is running in a steady stream from the mouth; perspiration is oozing from every pore and the body is soaking wet, shivering and cold. In addition to these effects there may be vertigo, vomiting, diarrhea, polyuria and constant coughing in order to clear the lungs of increased bronchial secretion.

For what purpose must a patient undergo this ordeal? Simply, that several pints of fluid may be removed from the system. In uremic poisoning, especially in puerperal eclampsia, where life is in great danger, relief must be obtained as quickly as possible. In such cases pilocarpine administered hypodermically in doses of one-half grain, by reducing œdema of the brain and by removing urea from the blood, may be the means of saving life. When there are five hours; at least, during which the patient's life is in no danger, a hydrogogue cathartic, as jalapine or bryonin, given in combination with a large dose of seidlitz salt, or our good, old calomel and jalap, will do the same.

The reduction of the dropsical effusion is just as certain and just as rapid as when pilocarpine is used; there is not much depression and very little, or no harm can result to the patient; and, certainly, he is much more comfortable during the action of a cathartic than during that of pilocarpine.

Precaution is necessary when prescribing this remedy for women during pregnancy, because of its tendency to induce labor-pains. In this one respect it has an action similar to that of ergotin, but is more powerful. When given during labor, it increases the strength and duration of uterine contractions.

Pilocarpine augments the secretions of the nasal, pharyngeal and laryngeal mucous membranes, and, on this account, it is recommended by Guttman as a remedy to be used in treating diphtheria with the hope, that the membrane may be more easily detached. As is usual with favorite remedies, some physicians report that they save the lives of all of their diphtheritic patients, while others, equally capable, have lost every case.

In diphtheria, when the lungs are involved and the pulse is rapid, feeble and easily obliterated, so depressing a medicine as pilocarpine must necessarily act with great detriment to the patient. In this feeble state the remedies indicated are caffeine and strychnine. When the membrane is in the fauces or in the larynx, and the patient is fairly strong, pilocarpine, given every hour in doses large enough to stimulate free secretion, frequently produces expulsion of the membrane.

In order to produce free laryngeal and pharyngeal secretion, it is not necessary to give large doses. For a child of one year, three granules, gr. 1-67, should be dissolved in twenty-four teaspoonfuls of water and one teaspoonful given every half-hour or every hour. Three granules may be added to the prescription for each year of the patient's age.

Children are not as susceptible to the action of pilocarpine as are adults. As this remedy increases the glandular secretions, it may be used to advantage in cases of suppression of milk, or even where the secretion is scanty. Four granules given every three hours will frequently restore the flow of milk, or, in cases where the supply is insufficient, the quantity will be augmented. In these cases, in conjunction with the administration of pilocarpine, the patient should be given the best nitrogenous diet possible, as meat, milk and eggs.

Pilocarpine frequently produces irritation of the gastro-intestinal canal and causes vomiting and diarrhea. When this occurs the medicine should be withdrawn. If this remedy is given early in the course of an attack of mumps, the disease may be aborted. It depletes the parotid glands by increasing the flow of saliva from them and thus reduces the inflammation. Pilocarpine may be used as a substitute for eserine in diseases of the eye, since it, when locally applied, produces contraction of the pupil.

The most marked antagonism exists between pilocarpine and atropine. Pilocarpine contracts the pupils, increases all of the glandular secretions, produces primary flushing of the face and secondary pallor. Atropine dilates the pupils, checks glandular secretions, produces primary pallor and secondary flushing of the face. Each of these alkaloids may be used as an antidote to overcome the evil effects of the other. Atropine should always be given in those cases where pilocarpine has caused such an excessive secretion of bronchial mucus as dangerously to embarrass the action of the lungs. Incidentally, it has been observed that bald-headed patients, who were undergoing a course of treatment with pilocarpine, have had their growth of hair restored.

It has, therefore, been utilized, either by internal administration or by external application to the scalp, to stimulate the growth of hair and to restore gray hair to its natural color.

From the preceding it will be seen that pilocarpine is an efficient diaphoretic, sialogogue, expectorant, galactogogue, mydriatic and hair-restorer. The diseases for which pilocarpine may be prescribed are uremic poisoning, hydrothorax and dropsies of all kinds not having their origin in the heart, mumps, diphtheria and other inflammations of the throat, larynx and bronchi.

CHAPTER XXV.

PODOPHYLLIN (RES.)

Standard granule—Gr. 1-6, gm. .01.

Dose—One or two, three times a day, or three to six at once.

Podophyllin is a resin obtained from the rhizoma and roots of podophyllum peltatum, or May apple, and is prepared in granules containing 1-6 of a grain. When three to six granules are taken, there is usually produced, within six hours, a copious, thin stool, preceded very probably by griping and nausea.

Many physicians use podophyllin exclusively whenever a cathartic is required. It is a very useful remedy to overcome habitual constipation, torpidity and congestion of the liver, and catarrhal jaundice. Chronic constipation is frequently cured by the use of small doses. One or two granules should be given half an hour before meals. If griping is produced, one granule of hyoscyamine should be added to each dose. As soon as one stool is produced each day, the dose should be diminished, or one of the doses may be omitted. The granules should be withdrawn gradually, as improvement advances. In cases of habitual constipation, it usually takes several weeks to effect a cure. When very prompt action is required, from three to six granules should be taken, with one granule of hyoscyamine and, to produce rapid and free action, a tablespoonful of seidlitz salt should be given two hours later.

CHAPTER XXVI.

QUASSIN (GLU.)

Standard granule—Gr. 1-67, gm. .001.
Dose—One to three before meals.

Quassin is the bitter principle of quassia, and is prepared in granules as above. Quassin is, undoubtedly the best bitter, stomachic tonic and promoter of the appetite that we possess. It acts by stimulating the gastric glands to increased activity, and is thus, indirectly, a digestant. Quassin is an excellent remedy to be used in all cases of indigestion where nausea, eructation or epigastric pain exists, as a result of fermentation in consequence of a poor quality of gastric juice.

In convalescence, few remedies are better suited to restore loss of appetite. In chronic dyspepsia, especially of drunkards, where large quantities of mucus are vomited, two or three granules each of quassin and emetine, given before meals, frequently effect a cure.

Migraine, consequent upon a feeble digestion, often yields to a course of quassin. If an acid is indicated, two or three granules of phosphoric acid may be given in conjunction therewith, or recourse may be had to hydrochloric or nitrohydrochloric acids, either of which are great aids to digestion under certain conditions.

CHAPTER XXVII.

QUININE (ALK.)

Standard granule—Gr. 1-67, gm. .001 For special sizes and dosage see text.

Quinine is one of the alkaloids obtained in variable quantity, 2 1-2 to 9 per cent, from the bark of various species of cinchona. In dosimetric medicine, the following granules are used; quinine arseniate, gr. 1-6 and 1-67; hydrobromate, gr. 1-6: hydroferrocyanate, gr. 1-6 and 1-67; picrate, gr. 1-6; salicylate, gr. 1-6; valerianate, gr. 1-6.

When quinine is dosimetrically used, or when it is prescribed in doses of one or two grains, it is a bitter tonic, antiperiodic, antiseptic and a cardiac and cerebral stimulant. When quinine is used in larger doses it is an antipyretic, oxytoxic, and a cardiac and cerebral depressant. It is also a poison to protoplasm, in as much as it checks the ameboid movement of white blood-corpuscles.

Full medicinal doses of quinine—from five to twenty grains—produce hyperemia of the brain, which can be observed by ocular demonstration in the retina and in the tympanic membranes. Accompanying this congestion, there is tinnitus aurium, and a sensation of fullness in the head with some vertigo. Temporary blindness and deafness have been produced by large doses of quinine. According to Binz, quinine is eliminated chiefly by the kidneys, but also by the salivary, sudoriferous and mammary glands. Usually within half an hour after a large dose has been taken, it makes its appearance in the urine and its elimination continues for two or more days.

Quinine does not occupy the prominent place in alkaloidal medication, that it does in the older methods. This has been shown by the publication of twelve prize lists of the twelve most useful medicines in dosimetry. These lists were prepared by different physicians residing in different parts of the United States and in only one of them was quinine mentioned.

As an antipyretic, quinine occupies a minor place. There are other remedies, as aconitine, digitalin and veratrine, which reduce fever, "quickly, safely and agreeably." In the treatment of all kinds of fever, quinine may be given in conjunction with other medicines, because of its tonic effect. Burggræve has established the excellent rule of giving arseniate or hydroferrocyanate of quinine and arseniate of strychnine after fever has been reduced by other means. Besides its tonic effect, it also prevents relapses.

In the treatment and cure of malarial diseases, quinine produces its most important therapeutical effect. Its action in these cases is so perfect as to make it, not only the chief of remedies of its class, but, also, a specific. Arseniate of quinine is best suited for the treatment of these diseases. This salt contains 74 per cent of quinine, 10.6 per cent of arsenic and 15.4 per cent of water. The arsenic contained in this preparation undoubtedly aids the quinine in neutralizing the malarial poison and, therefore, in effecting a cure. On account of the arsenic, the dose, necessarily, must be small. The arseniate does not derange the stomach, like the usual doses of other salts of quinine, and its contra-indications are few.

In the treatment of intermittent fevers, two granules of arseniate of quinine, each containing one-sixth of a grain, should be given every two hours, while in remittent fever two granules should be given every hour. In the pernicious or congestive form of malarial fever, the chill should be anticipated, if possible, and three or four granules of atropine sulphate, gr. 1-250 each, should be injected subcutaneously. If coma or vomiting exist, one or two grains of hydrobromate of quinine should be injected hypodermically, every hour until there are evidences of improvement, or until some physiological effect of the medicine is produced. Physicians who practice in malarial districts should be prepared to treat, hypodermically, this very *fatal* form of malarial fever.

The doses of quinine recommended must, necessarily, seem very small to those physicians who are in the habit of prescribing from twenty to forty grains in one or two doses. According to Burggræve, Castro and others—and their opinions can be substantiated by the writer as well—all forms of malarial fever, even the most pernicious, can be cured dosimetrically. If cinchonism is necessary, it may be produced by giving small doses of quinine frequently repeated. It is of the greatest importance to prevent the chill, if possible, by the administration of atropine, and to give arseniate of strychnine and of quinine during the stage of apyrexia.

It is the custom, with many practitioners of medicine, to give a full dose of calomel, grs. 10, as early as possible in the treatment of malarial diseases, and to give ten or twenty grains of quinine about four hours before the time of the expected chill. In dosimetry, as in everything else, we are likely to hold fast what has proved good. If physicians have been accustomed to use large doses of quinine, and have cured their patients, it is probably best to continue this practice. If, however, large doses fail to cure, small doses should be tried, as recommended above.

Quinine is also used in the treatment of all kinds of neuralgia, but it is best adapted to those cases which manifest most periodicity. In simple neuralgia of anemic patients, the hydroferrocyanate may be used; in neuralgia of malarial patients, the arseniate is preferred; while in neuralgia of rheumatic patients, the salicylate is indicated.

When nervous disorders are of malarial origin, as chorea and asthma, hydrobromate or valerianate of quinine should be used. Quinine is probably given more frequently, and is used in the treatment of a greater variety of diseases, than any other medicine. The habit of prescribing quinine has grown so strong with some practitioners that they have become routinists. Fortunately, quinine can do no harm in small doses, but acts as a stomachic tonic, and increases the functions of the heart and brain; consequently, a course of quinine usually improves the condition of any patient. It is always an excellent remedy to give when there is no indication for the use of any particular medicine. As has been aptly said, "when you don't know what to give, give quinine."

In the treatment of disease, especially of a serious nature, medicine rarely cures unless it produces some physiological effect. This may not always be apparent but, nevertheless, it occurs. In the treatment of serious, malarial diseases, the writer believes it is necessary to push the quinine treatment until there are evidences of improvement or until fullness of the head or tinnitus aurium is produced. In the treatment of milder cases, prominent symptoms are often relieved before the physiological effects of the medicine have been produced.

When a remedy is indicated, we are justified in continuing its use until some effect upon the system is manifested, but we should not proceed beyond the first physiological manifestations.

We can, if it is necessary, keep the patient under the influence of the medicine to this extent. This can be accomplished, properly, only when medicines are dosimetrically used. In the treatment of malarial diseases of adults, one, two or three granules of arseniate of quinine, gr. 1-6 each, should be given every one, two, or three hours, according to the severity of the attack. The remedy should be persevered in until some improvement is observed or until ringing in the ears is produced. The same dose should then be given every three or four hours. For children, granules containing 1-67 of a grain should be used.

CHAPTER XXVIII.

SCILLITIN (GLU.)

Standard granule—Gr. 1-67, gm. .001.
Dose—Two or three granules every one or two hours.

Scillitin is the active, medicinal principle of scilla, or squills. Scillitin is an expectorant and a diuretic. In acute or chronic bronchitis, where the sputum is tough and difficult to expectorate), the tenacious mucus is liquified and the cough is made easier by the administration of scillitin. Emetine and scillitin make an excellent combination for bronchitis.

In the treatment of dropsies, not dependent upon acute nephritis, scillitin is extensively used and it increases the quantity of urine. Caffeine and digitalin may be added to it with advantage. The dose for adults is two or three granules, to be taken every one or two hours. For children, from one to five years of age, from five to ten granules may be dissolved in twenty-four teaspoonfuls of water, and one teaspoonful given every hour. In large doses scillitin irritates the gastro-intestinal mucous membrane and produces vomiting and diarrhea. It also irritates the kidneys and bladder, producing bloody-urine and stranguary. It is contra-indicated, therefore, in inflammatory conditions of the alimentary canal and inflammation of the kidneys.

CAHPTER XXIX.

SEIDLITZ SALT—ABBOTT'S SALINE LAXATIVE.

Dose—One to four, or more drachms, as needed.

Abbott's Saline Laxative is a C. P. sulphate of magnesia in effervescent combination from which, by a special process, all irritants have been removed and with them that notoriously disagreeable taste that has heretofore rendered the use of this most important therapeutic agent so objectionable.

The action of seidlitz salt is that of a mild aperient, and it can be taken by persons of the most delicate constitution. If there is one thing which Burggræve emphasizes more than any other, it is that this salt should be given in all diseases; in both acute and chronic cases this is usually a good rule to follow.

In acute febrile diseases the gastro-intestinal secretions are usually checked and constipation is the result. The fecal matter thus retained within the intestines, under the influence of the increased heat of fever readily undergoes fermentation. The poisonous materials and gases formed, not having an outlet, must be absorbed into the blood and toxemia is the result. When this occurs there is foul breath, a bad taste in the mouth and frontal headache.

Sometimes febrile diseases have, as their sole cause, this condition of constipation. The fever is produced entirely by the absorption of the products of intestinal decomposition. A cure of these cases immediately follows the action in an aperient. This clearly demonstrates the utter absurdity of the practice of some physicians, never to use cathartics no matter how distended the abdomen, how long constipation has existed or how foul the breath or tongue may be. A more foolish and generally harmful idea never prevailed.

Not only is the fecal matter removed by the action of a saline aperient, but the accumulated mucus is removed from the lining membrane of the gastro-intestinal tract and a better secretion produced, which must greatly improve the absorbing power of the stomach and intestines.

In all febrile diseases, therefore, a teaspoonful of seidlitz salt given in half a glassful of water, insures quicker absorption and better action of the medicine given.

In the treatment of children a tablespoonful of the above solution may be given every two or three hours.

One of the most important auxiliaries in the treatment of intestinal diseases of children, during summer months, is seidlitz salt. Cholera infantum, gastro-enteritis and entero-colitis are usually produced by the presence of decomposing food within the alimentary tract. Improvement cannot occur as long as fermenting material remains, and one of the best evacuants is seidlitz salt.

While seidlitz salt is not identical in composition with the well-known seidlitz powder, its action and result are at least similar, and seidlitz salt may be used in all cases which usually call for seidlitz powders. The great value of the latter aperient is very well known to the laity, as a means of cooling the fevered stomach and clearing the muddled brain after a spree. This accounts for the large sale of seidlitz powders on Mondays.

In the treatment of chronic diseases, seidlitz salt is an important remedy with which to empty the intestinal tract. Patients improve much more rapidly if the bowels move every day. In the treatment of pelvic diseases of women, a teaspoonful of seidlitz salt every morning aids very greatly in relieving conjestion and in subduing inflammation.

All saline cathartics stimulate the functions of the kidneys and of the skin, so that seidlitz salt increases the activity of the most important excretory glands, whereby the elimination of toxic materials is facilitated. In the treatment of gout and of rheumatism, a daily dose of seidlitz salt very greatly aids colchicine in eliminating uric acid and urates.

CHAPTER XXX.

SPARTEINE (Alk.)

Standard granule—Of the sulphate; gr. 1-67, gm. .001.
Dose—Two to three every two or three hours.

The tops of cytisus scoparius, or broom, contain two active principles. One is scoparin, which probably represents the diuretic and drastic properties of broom, and the other is sparteine, which represents the heart-tonic properties of the plant.

The most desirable preparation is a neutral sulphate; this is similar in its action to digitalin and, in common with other cardiac remedies, may be used in all cases in which the latter is indicated. It is not so powerful a remedy as digitalin, but it has the great advantage of acting very rapidly, usually within thirty minutes, and, besides, its effects are more lasting.

The diuretic properties of sparteine are not so marked as those of digitalin, but in cases in which the cardiac movement is feeble and irregular, and the urine is scanty, it may be used with good effect; in dropsies of renal or hepatic origin, however, this remedy is of no value. In palpitation produced by functional derangement, accompanied by pain, sparteine is probably the best and most rapidly acting of heart-remedies.

It relieves the pain and regulates the rhythmical action of the heart.

In organic affections of the heart, it is of the greatest value in the treatment of mitral regurgitation, and it affords relief in asthma, and also in œdema when produced by cardiac diseases. Sparteine does not act upon the vaso-motor centers as does digitalin and, therefore, the arterioles do not contract or relax under its influence, neither is there marked increase of the blood-pressure.

In all cases it is best to begin treatment with small doses. Two or three granules may be given every hour, and if improvement is manifested the dose should then be given every two or three hours. In painful affections of the heart, not inflammatory, accompanied by palpitation, if relief is not obtained within twenty-four hours the dose should be gradually increased to one-half of a grain, which may safely be given every three or four hours.

In aortic regurgitation, according to Clarke, smaller doses are required than in the treatment of mitral disease.

CHAPTER XXXI.

STROPHANTHIN (GLU.)

Standard granule—Gr. 1-500, gm. .000125.
Dose—Two granules every half to two hours.

Strophanthin is obtained from strophanthine hispidus. It does not contract the arterioles, but in all other respects it is similar in its action to digitalin. In the majority of cases it is inferior to digitalin, but sometimes it may produce good results even after digitalin has failed to produce any improvement in the patient. In such cases strophanthin, sparteine, convallamarin or cactin may each be given a trial, or combinations may be made of these similarly-acting remedies.

Strophanthin acts directly upon the heart-muscle and produces a more vigorous and prolonged contraction. The heart's action is thereby made slower and more regular, and the pressure within the blood-vessels is increased.

This medicine is, therefore, recommended when the pulse is feeble, easily compressed and intermittent, especially when these symptoms occur in cases of typhoid fever or in pneumonia, or when the patient has been under a severe and prolonged mental or physical strain, or when tobacco has been used to excess.

It is further successfully employed, in œdema, especially when occuring in the lungs as a result of mitral stenosis or insufficiency and of dilatation of the right ventricle. Not only have dropsical effusions, in the cellular tissue, been rapidly removed by the administration of strophanthin but, also, those of the serous cavities. In relieving these conditions, strophanthin acts as a diuretic by increasing the blood-pressure and, probably, by stimulating the renal epithelium. In acute nephritis, this remedy seems to act injuriously, by increasing the inflammation of the kidneys, but in chronic nephritis with œdema it produces good results.

One of the excellent qualities of strophanthin is that it acts quickly; its effects are observed within half an hour. The dose of strophanthin is two granules every half-hour, when a rapid action is desired. When improvement in the patient's condition is manifested, the dose should be given every two hours. In chronic cases two, three or four granules may be given every three hours, and the dose may be increased or diminished as necessity requires.

CHAPTER XXXII.

STRYCHNINE (ALK.)

Standard granule—Gr. 1-134, gm. .0005.

Dose—One to six three times a day, or one every half to one hour under special conditions.

Strychnos nux vomica contains two alkaloids, strychnine and brucine. The yield of strychnine is from 1-4 to 1-2 per cent, while that of brucine is 0.12 per cent.

These two alkaloids are similar in their action; but brucine, being much milder, is preferred when prescribing for children. The following is the list of alkaloidal granules prepared from the various salts of strychnine: The arseniate, gr. 1-134, gm. .0005; hypophosphite, gr. 1-134 gm. .0005; nitrate, gr. 1-67, gm. .001; sulphate, gr. 1-134, gm. .0005, and the valerianate containing gr. 1-134, gm. .0005.

In dosimetric practice the arseniate is more frequently used than any other salt. Its chemical composition is as follows: Strychnine 72.5 per cent, arsenic 12 per cent, water 15.5 per cent.

According to Bartholow, "The effects of strychnine are exerted on the spinal cord at the seat of motor function."

"When taken in quantities just sufficient to produce sensible physiological effects, strychnine induces, in man, a feeling of restlessness, perhaps accompanied by trembling in the limbs and some stiffness in the neck and jaws. When a somewhat larger amount has been taken, there may be general muscular twitchings and startings with stiffness and stricture of the throat and chest."—*H. C. Wood.*

It is sometimes necessary, in the treatment of neurasthenics and others, to push the administration of strychnine until the first physiological effects are produced, before any impression can be made upon the case. To produce this effect, two granules of the nitrate, gr. 1-67 each, may be given every hour until a feeling of stiffness in the neck and jaws is perceived; one-half of the dose may then be continued every two hours.

One-twelfth of a grain of strychnine, taken in a single dose, will produce, in a majority of persons, some physiological effect, which is usually manifested within half an hour. When giving strychnine for the above purpose, it is best to administer it in solution. In cases of accidental poisoning or attempted suicide by means of strychnine, hydrate of chloral is the best antidote, after the stomach has been evacuated.

Strychnine is an exceedingly bitter medicine. When it is taken through the mouth, its first action is to augment the secretions of the stomach and intestines and to increase peristalsis*. It may be used, therefore, during convalescence; to restore the appetite in dyspepsia; to promote better digestion by increasing the quantity of gastric juice and to overcome constipation, by increasing intestinal secretion and by stimulating the muscles to more vigorous peristalsis.

Strychnine is a useful adjunct to all cathartics. It should be used, especially, in constipation of the aged, or in those individuals who take little or no muscular exercise. In all reflex vomiting, especially in pregnancy, one granule of the hypophosphite of strychnine, given every hour, frequently cures the patient. In the morning vomiting of drunkards, two granules of the arseniate and two of arseniate of soda will often procure relief.

In poisonous doses, strychnine produces death by paralysis of the respiratory muscles, but in small doses it is a powerful respiratory stimulant. In all chronic lung diseases, where the patient is unable to exercise sufficient muscular power to completely expel the mucus, two or three granules of strychnine arseniate given every two hours will often produce surprising results. In the vomiting of phthisis, Bartholow considers the strychnine as the most effective of all medicines.

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*This is due, in a great measure, to the intensely bitter taste. We often make use of this in atonic conditions of the digestive organs, by giving the granules in solution at frequent intervals. For this purpose small doses suffice, three or four granules in half a glass of water being all that is necessary. When for any reason the bitter taste is an objection it is best covered with saccharin, one-half to one granule o each granule of strychnine.—PUB.

Upon the heart, strychnine is a very potent stimulant. It increases the tone and strength of its action, contracting the arterioles and raising the blood-pressure. Strychnine is one of the most useful of all heart-tonics and stimulants, and should be used in all cases where there is irregular or feeble cardiac action, especially in asystolia and dilation, and in those chronic forms of heart-disease in which digitalin, cactin, sparteine and other heart remedies, after a most faithful trial, fail to make any impression upon the diseased organ. In these cases, it is best to administer strychnine in doses of three or four granules every two hours, not with much hope of effecting a cure, but for the reason that it is the best medicine that can be given to sustain life as long as possible.

Strychnine is the most useful general tonic, and the most powerful incitant of the vital functions that we possess. There is no depressed state of the system in which strychnine is not indicated, and in which it may not be used to advantage. During the prodromal stage of fevers, when the temperature is abnormal, and when general depression exists, no remedy can so effectually restore the patient to his normal condition as strychnine and phosphoric acid, given in doses of one or two granules of each, every half-hour. This method of treating the precursory stage of fever originated—as did many other good things—with the learned master, Burggræve, and has proved to be of great efficacy.

Throughout the course of all fevers strychnine is one of the most useful remedies, because it sustains the heart and keeps up the tone of the nervous system. For this reason it has been added to the defervescent remedies, and in combination with them forms granules, known as "Defervescent Compound" and "Dosimetric Trinity." If medicines do not produce their usual and expected results, through failure to make an impression upon the nerve-centers because of a low degree of vitality, strychnine will stimulate the nerve-tissue and arouse it from the depression produced by disease, so that, when other medicines are administered, they are more efficient in their action.

It may be said, then, that in the treatment of all diseases better and quicker results are obtained from other medicines when strychnine is given therewith. In the treatment of malarial diseases, quinine is made more potent if given with arseniate of strychnine. In the treatment of many cases of atonic diarrhea, dysentery, and cholera, improvement does not occur until strychnine has been administered.

The action of digitalin is greatly increased when combined with strychnine. Digitalin sometimes fail to effect a cure when given alone, but as soon as strychnine is used improvement is manifested. This is true, also, of all heart-remedies. Strychnine is needed in connection with them to energize the cardiac nerves and muscles.

"Strychnine exalts all the functions of the spinal cord—reflex, motor, vaso-motor and sensory—the latter being least affected."—*Potter.*

Strychnine is a remedy which, in its effect upon the nervous system, closely resembles the action of electricity. There is better receptivity and conductivity; there is increase of nerve-energy and this energy is imparted to the voluntary and involuntary muscles causing them to respond and contract with more vigor. This influence upon the muscles is particularly shown when strychnine is administered in cases of partial or complete paralysis, and in cases of uterine inertia. In incontinence of urine, also when retention is the result of paralysis and when constipation is produced by absence of peristalsis, strychnine is a most useful remedy to restore irritability and contractility to the paralyzed involuntary muscles.

This action is still further shown when, in case of labor, the uterine contractions are feeble, or have ceased altogether; vigorous contractions may be induced by injecting, hypodermically, 1-30 of a grain of nitrate of strychnine, or by administering two granules of the hypophosphite every half-hour until ten granules have been taken.

If post-partum hemorrhage is anticipated (it having previously occurred in a given case, or because of the flabby condition of the uterus), 1-30 of a grain of the nitrate of strychnine should be given subcutaneously, and this should be repeated, if necessary, within half or one hour. As soon as the placenta has left the uterine cavity, two or three grains of ergotin should be administered hypodermically; and this should be repeated every half-hour until permanent uterine contraction is assured.

It is one of the tenets of dosimetry, that any unfavorable tendency of the disease should be anticipated by the early application of remedies, in order to prevent its occurrence. Post-partum hemorrhage should be anticipated, when, in previous labors, uterine contractions have been feeble and the loss of blood considerable. In these cases, strychnine should be administered more or less continuously, during the entire period of gestation. Two or three granules of the arseniate may be given three times a day for one month, then for one or two weeks give quinine and iron granules, when strychnine may be again resumed in the form of the hypophosphite and administered for several weeks. This method, or one similar to it, should be followed and the result will be more vigorous uterine contractions.

The paralysis accompanying capillary bronchitis, diphtheria and peritonitis should also be anticipated and prevented, by giving strychnine throughout the course of the disease. When given in peritonitis, it prevents distention of the intestines, or tympanites, a condition which is always dreaded and is very difficult to overcome. In this disease two or three granules of the hypophosphite may be given every two hours. If it has not been given from the onset of the attack, as a preventive, it may be administered, even if tympanites is marked, with the hope of inducing contraction of the intestines and expulsion of the gas.

It is much more rational to anticipate the fatal tendencies of disease, and to prevent them by appropriate medicines, than to wait until they have made their appearance.

To postpone the administration of strychnine in capillary bronchitis, until with each inspiration there is sinking of the abdominal wall along the margin of the ribs, is absolutely wrong. Good results cannot then be accomplished, paralysis has already set in and even strychnine fails to stimulate nerve-tissue which has been poisoned by carbonic acid gas. Strychnine is a valuable remedy to use in the treatment of paralysis, especially when it follows in the course of diphtheria, rheumatism, malaria and lead-poisoning. In paralysis of long standing, where muscles no longer respond to the application of electricity, this remedy is useless.

When impotence is due to sexual excesses, and there is lack of muscular tone, two granules of arseniate of strychnine and two of phosphoric acid, given every three hours, will, in the course of a few weeks, effect a cure. No remedy is so strongly indicated in surgical shock and in collapse as strychnine, but only in very large doses. According to Hare, "not less than 1-20 of a grain should be employed, hypodermically, every half-hour."

Strychnine is such a strong stimulant, that the writer never finds it necessary to prescribe alcohol in any form and, during years of very active professional life, he has learned that it is possible to practise medicine very successfully without using it at all. In cases of typhoid fever and pneumonia, where whisky and brandy are most frequently used, it has been demonstrated that patients recover more rapidly, and are in a better condition at the end of the disease, without alcohol than with it.*

The prescribing of alcoholics has become a habit and, like all habits, excuses are easily made for it. The majority of adult patients are fond of alcoholic drinks and physicians usually strive to please their patients. Strychnine replaces alcohol. It is a true tonic and stimulant and is free from the evil tendency of forming a habit. It may be used in all cases of emergency where whisky is generally prescribed.

As a substitute for alcoholic liquors, the wonderfully stimulating powers of strychnine are demonstrated, when it is administered to one who has been surfeited with drink and the usual glass of liquor fails to awaken a response, or to make an impression. That is, the customary drink does not steady the trembling, palsied body, clear the benumbed brain, or loosen the paralyzed tongue. In these cases, even the stomach is rebellious and rejects the favorite drink, and the shattered nervous system no longer exercises its controlling influence. Hypophosphite of strychnine is the only remedy that can still arouse the alcohol-soaked brain and restore the narcotized and almost useless mass to its former high position as ruler.

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*To this we would add our most emphatic and unqualified approval.—PUB.

This wonderful medicine can be used, not only as a restorative but, also, as a preventive against the use of liquors. There is an unfortunate, diseased class of people, who abstaining from intoxicating drinks for weeks and months, after a variable period become restless, nervous and dissatisfied with themselves and their surroundings and possessed with a desire, a thirst, an irresistible craving; they drink, and by the attempt to satisfy this unsatiable thirst they become drunk, and remain so for days until nature is exhausted and ends it all in a prolonged sleep, or in an attack of delirium tremens.

If these unfortunate creatures could know, that when this restlessness first comes on, a hypodermic injection of 1-30 of a grain of nitrate of strychnine, administered once or twice daily, would so tone the nervous system and subdue the restlessness, that the stage of irresistible thirst might never be reached, if they could know this, I repeat, many a man, yes many a woman would be saved from a periodical spree.

It is the duty of every physician to make a trial of this remedy for the purpose of preventing drunkenness, in all cases over which he has control. Like all remedies this one may fail sometimes but it is usually successful.

CHAPTER XXXIII.

VERATRINE (ALK.)

Standard granule—Gr. 1-134, gm. .0005.
Dose—One every half to one or two hours.

Veratrine is prepared from the seeds of sabadilla and was discovered by Meissner in 1819. While veratrine is similar in its action to veratrum viride, it is not the active principle of this plant, which is represented, principally, by the alkaloids cevadine and jervine.

In dosimetric medicine veratrine is prepared in granules containing 1-134 of a grain, gm. .0005. It also enters into the granules known as "Abbott's Defervescent Compound No. 1." and "No. 2." Defervescent Compound No. 1, contains aconitine amorphous, gr. 1-134, gm. .0005; digitalin Germanic, gr. 1-67, gm. .001 and veratrine gr. 1-134, gm. .0005; Defervescent Compound No. 2, contains one-fourth the quantity of each.

The dose of veratrine recommended in the National Dispensatory ranges from 1-60 to 1-4 of a grain. In dosimetric practice one granule is the dose, which may be repeated every half-hour until improvement is observed. Veratrine is used chiefly in the beginning of acute diseases, and particularly in pneumonia and rheumatism.

Care should be taken, always, to note that the patient's heart is strong. Its effects, when administered in sthenic febrile cases, is to lower the pulse and temperature, to reduce the vigorous action of the heart and to increase the secretions. When thus given, early in the course of acute diseases, jugulation is frequently the result.

Large doses from gr. 1-60, to gr. 1-4," should never be given. This is, in reality, "making the remedy worse than the disease." Such a dose would produce, in the majority of patients, violent vomiting, possibly purging and extreme prostration. The vomiting produced by veratrine is its safe guard against poisoning. If too large a dose is taken, emesis follows and the medicine is rejected before harm results. There is never any occasion for these large doses. One granule, gr. 1-134, given every half-hour, will gradually produce, in the course of a few hours, the full effect of the remedy. If vomiting should occur, the medicine should be given at longer intervals.

Abbott's Defervescent Compound No. 1 is probably the most powerful combination that can be formed with which to combat acute, active fever. There need be no hesitancy in giving this granule to a strong patient, whose pulse and heart is bounding vigorously. When the temperature is 105 degrees, one granule may be given every fifteen minutes and, as improvement is observed, the dose may then be given every hour. Veratrine is sometimes given to allay the pruritus which accompanies cutaneous diseases. One granule every two hours is sufficient.

CHAPTER XXXIV.

ZINC SULPHOCARBOLATE.

Standard granule—Gr. 1-6, gm. .01.

Dose—One-sixth grain to five grains, according to indications.

Sulphocarbolate of zinc is made by decomposing a solution of barium sulphocarbolate with zinc sulphate. In dosimetric medicine, it is prepared in granules containing 1-6 of a grain, and it can also be obtained in tablets containing one grain, or two and one-half grains.

The older one grows in the practice of medicine, the greater will be the tendency to confine oneself to the use of a few tried and trusty remedies. From a small number of reliable medicines, rarely exceeding twelve, selected, during years of experience, from thousands of remedial substances, practical physicians make various combinations, by means of which they can alleviate suffering and cure disease. It is of great importance, in a successful medical practice, that the physician should have the utmost confidence in the remedies which he employs; and, not only must he have confidence himself, but he should also be able to instill his confidence into his patients; his success is then assured. One remedy, sulphocarbolate of zinc, has won the utmost confidence of the writer, through a very extensive experience. Living, as he does, in a large and crowded city, which, during the summer months, is one of the hottest places in the country, ample opportunity is offered him to test this preparation thoroughly, in the treatment of such diseases as cholera-morbus, cholera-infantum and diarrhea.

The heat of summer not only depresses the individual and lowers his power resisting disease, but it also produces such changes in his food as render it unfit for consumption, and makes it a fruitful source of alimentary disorders.

Gastro-intestinal diseases are almost invariably produced by unwholesome food and drink, which cannot be properly acted upon by the digestive fluids and rendered harmless. They, therefore, undergo fermentation, evolve gases and form acids, which distend and irritate the gastro-intestinal canal, and produce pain, vomiting and diarrhea. If the irritation is severe, all of these symptoms may be present at the same time. Vomiting or diarrhea are the results of nature's effort to get rid of this decomposing food but, even after it has been expelled, there frequently remains an irritable condition of the stomach and intestines which may continue for days.

In the treatment of gastro-intestinal disease, the first symptom which requires attention is pain. If this is severe, and the patient is an adult, a hypodermic injection of morphine and atropine should be administered. If the pain is not severe three granules of zinc and three granules of codeine, gr. 1-6, should be given every half-hour. Three granules of zinc and one of hyoscyamine is also an excellent combination to be used for the relief of pain. When the patient begins to improve, the medicine should be given every one or two hours. A recently devised tablet (A. A. Co.), containing zinc sulphocarbolate, codeine sulphate, and hyoscyamine amorphous, with strychnine sulphate, meets all these indications admirably.

If vomiting is the most prominent feature of the disease, so that even the medicine is rejected, a hypodermic injection of morphine and atropine will relieve this annoying symptom.

If this means is not used, the same result may frequently be attained by giving the patient small pieces of ice to suck, by giving teaspoonful doses of lime-water, by applying a mustard plaster to the epigastrium, or by giving one-half grain doses of sulphocarbolate of zinc every half-hour. This latter remedy frequently checks vomiting with surprising promptness. The worst forms of vomiting and diarrhea are often cured by giving sulphocarbolate of zinc alone.

The diarrhea accompanying phthisis and typhoid fever are almost invariably checked, by taking doses containing one or two grains of this remedy, or the Zinc and Codeine Compound, every two hours. In typhoid fever, as suggested by Waugh, zinc is one of the best remedies to administer throughout the entire course of the disease; it prevents fermentation, checks diarrhea and renders the intestinal canal aseptic. Sulphocarbolate of zinc is one of the best and safest intestinal antiseptics and astringents with which we are acquainted. Its virtue as an antiseptic depends upon the carbolic acid it contains, which is rendered less irritating in this combination than in its pure state, while its astringency is due to the zinc in its combination.

Zinc is a remedy which should be given a trial in the treatment of all forms of diarrhea, but especially in those cases caused by fermentation as is shown by mushy and frothy stools. In intestinal indigestion, when pain and stools occur several hours after ingestion of food, one or two grains of zinc sulphocarbolate, given with each meal, frequently produce a cure.

But even this excellent remedy sometimes fails, as shown in one very obstinate and persistent case of diarrhea (the cause of which was not apparent) which resisted every kind of treatment; not only the older, "orthodox" methods, by means of bismuth, tannic and sulphuric acids, acetate of lead, opiates and salol, but even dosimetric treatment by means of zinc, copper arsenite, and others. Improvement began, however, as soon as strychnine arseniate was administered and, from that time, the patient made a rapid recovery. Some remedy was required which could awaken and stimulate the dormant nerve-power and make it respond to medicinals. The diarrhea which best yields to strychnine is of the kind that may be called passive; the stools occur without any muscular action; they flow from the patient without his cognizance.

While sulphocarbolate of zinc is an excellent remedy in the treatment of the diarrhea of adults, its chief therapeutical value is manifested when used in the treatment of intestinal diseases of infants and children. The writer always uses zinc in the treatment of diarrhea, sometimes alone but, frequently, in combination with codeine or hyoscyamine. The case must be one of extraordinary severity which cannot be cured by these remedies.

In treating cholera-infantum and diarrhea of infants, sulphocarbolate of zinc should always be given in solution. It is a remedy which infants bear exceedingly well. A child a month old may be given a granule, gr. 1-6, every half-hour, or every hour and, strange as it may appear, it has not been found necessary to increase the dose for children under one year. The remedy is not poisonous, and it is not necessary to use the same precaution that must be used in prescribing dangerous medicines.

In excessive doses it acts like sulphate of zinc and, therefore, produces vomiting. When this occurs, it is an evidence that the dose has been too large and should be diminished. The following prescription will be found proper and useful in the treatment of gastro-intestinal disease in children under one year of age: Four grains of sulphocarbolate of zinc, or twenty-four granules, may be dissolved in twenty-four teaspoonfuls of water. A teaspoonful of this solution should then be given every half-hour or every one, two, or three hours, according to the severity of the attack. If there is much fever, one or two granules of amorphous aconitine, gr. 1-134, should be added to the above prescription.

The vomiting, diarrhea and pain usually cease altogether or, at least, the patient is made to feel easier within a few hours. If there is very great pain, two, three or four granules of hyoscyamine should be added to the zinc solution and, as soon as improvement is manifested, a teaspoonful of the mixture should be given after each stool.

When hard lumps of undigested caseine are found in the stools, the diarrhea and pain are produced by the presence of similar masses within the intestines. Treatment should then be begun by giving a cathartic, either calomel, seidlitz salt or castor oil.

The patients should be fed on barley for a few days, but not on milk, because of the tendency of milk, in these cases, to form large coagulations. When milk is finally resumed, it is best to mix it with barley-water and to give pepsin with each meal. If the stools are green and contain mucus and blood, emetine and zinc are the remedies indicated. If there is much straining, and only small quantities of mucus and blood are passed, castor oil or seidlitz salt should be given and, when a normal stool is produced, emetine and hyoscyamine may be administered.

It is a strange and universal characteristic of adults, when suffering from gastro-intestinal diseases, that no matter how much pain or diarrhea follows eating, they will still continue to indulge in their usual diet. Fried potatoes, pork, veal, ham and eggs fried hard, boiled cabbage, corn, tomatoes, cucumbers, sausage, cheese and coffee are among the most indigestible foods. Patients continue to partake of such a diet and yet they wonder why they do not get better.

With infants, a similar course is pursued; their usual diet is not persisted in, but it is given in larger quantities because of the thirst of the patient. Neither do mothers hesitate to feed infants upon potatoes, corn and other indigestible foods. The great wonder is, therefore, not that so many infants die, but that so many of them live. The most potent of remedies used in the treatment of diarrhea, are powerless to effect a cure if patients indulge in an improper diet.

The selection of a proper diet is far more difficult than is the selection of proper medicines, and the best possible means to get rid of this vexed question is to order the patient to fast. The first thing which a patient, who is suffering from diarrhea, usually says is, "What must I eat?" The answer should invariably be, "Nothing," and the more completely the patient refrains from eating, the sooner will he recover. Physicians must impress upon their patients the fact that lack of food, for a few days, does not result in death by starvation, and that no possible harm can come from such abstinence. Infants frequently go for a longer period without nourishment, and it does not injure them.

When severe diarrhea is present, no matter how much food is swallowed by the patient, he is, in reality, without nourishment so far as digestion and assimilation are concerned. The food which is given him is treated by the stomach as if it were a foreign body; the digestive fluids are diminished in quantity and inferior in quality, and the food is either rejected by the stomach or passed out with the stools unchanged, and can be easily recognized. Food given under these circumstances cannot benefit the patient, but only adds to the difficulty.

How much more reasonable, then, does it seem, to withdraw all food for one or two days and give the stomach and intestines a rest. While the gastro-intestinal canal is thus empty the remedies applied are brought in immediate contact with the diseased mucous membrane, and are much more effective, and more quickly absorbed than when mixed with quantities of food. When a patient's knee-joint is inflamed, he is, indeed, a poor surgeon who permits him to walk and run. When a patient's gastro-intestinal tract is irritable and inflamed, he is a very poor physican who permits these structures to be kept in action by vainly attempting to digest food. This attempt at digestion is just as irritating to the inflamed stomach and bowels as is walking to the inflamed knee.

What food, then, should the patient take who has diarrhea? For the first day let him eat no food of any kind. If thirst is intense, cold water may be given frequently in small quantities, or pieces of ice may be held in the mouth and allowed to melt. In treating cases of cholera-infantum, it is imperative to stop nursing the child for one or more days; when this is done improvement occurs rapidly. Infants should be given small quantities of water, or some aromatic tea made without sugar. Even in cases that are not severe they should not be allowed to nurse constantly, but only at stated intervals. They cry and fret because of thirst and pain, not because of hunger, constant nursing overloads their stomachs and only aggravates their condition. After one or two days of fasting, barley-water may be given, or barley-gruel, in which lamb or beef has been stewed. In making this gruel it is best to use whole barley, which may be ground in a coffee-mill; after being thoroughly boiled it should be strained before it is allowed to cool. This is the most easily digested of all foods and as nutritious as any. If adult patients tire of barley, the white of an egg should be stirred into a glassful of water and slowly taken. This may be repeated every three hours; smaller quantities may be given to children. This is easily digested, and is the representative nitrogenous food. As it is almost tasteless, adults and even children drink it without being aware that they are taking food.

Beef tea may also be given. If patients object to the extracts found in the market, an excellent article may be made according to the following receipt: One pound of lean beef should be chopped fine and put into one pint of cold water and allowed to stand for one hour, then the beef and the water should be placed over a slow fire and allowed to simmer for two hours, when the fluid should be poured off and enough water added to make one pint. To this sufficient salt must be added to make it palatable and the patient may drink it hot, or after it has been placed on ice. Oyster stew, made with or without milk, may also be given, but only the broth should be used. Chicken broth should never be given to those suffering from diarrhea; it very likely to aggravate the disease. In the feeding of infants, barley broth should first be tried, or some of the artificially prepared foods as "Malted Milk," "Wolf's American Food," "Liquid Peptones," or other preparations which the physician has found to be useful.

If cow's milk is fed to infants, it should be thoroughly sterilized, not only when given in cases of sickness but at all times. Lime-water may be added to correct vomiting, and barley-water to prevent caseine from forming into hard masses. Toast is the only form of bread which should be allowed those who have diarrhea. In the process of toasting, some of the starch is transformed into dextrine and sugar, and the starch granules are ruptured, which makes digestion easier. While the majority of cases of diarrhea can be cured by a properly selected diet, or, rather, by fasting and the administration of medicine, there are a few cases which cannot be benefited by these means alone, but require absolute rest in bed. It is a good plan, when diarrhea continues unabated for one week, to put the patient to bed. Rest is an extremely useful auxiliary in the treatment of bowel disorders.

Besides the important part which sulphocarbolate of zinc plays in the treatment of gastro-intestinal diseases, it has been used as a wash in surgical dressing to prevent septicemia. It is the one remedy used by the writer in the treatment of ulcerative stomatitis. If there is much fever, aconitine is added to a solution of zinc as follows: For a child of two years, four grains of zinc and three granules of amorphous aconitine, gr. 1-134, are dissolved in three ounces of water, and a teaspoonful is given every half-hour or every hour. Topical applications may be made in severe cases, using ten grains of the zinc to an ounce of water.

As an injection for gonorrhea or leucorrhea, in the proportion of one to three grains to the ounce of water, it will be found to be an effectual remedy after the acute inflammatory symptoms have subsided.

APPENDIX.

Showing Comparative Dosage of Active Principles as Given by Different Authorities.

Physicians who are just beginning to prescribe the alkaloids, invariably entertain a fear that the doses they give are too large. Contemporary medical teaching has instilled into their minds a dread of the active principles, and as a result they are looked upon as very dangerous remedies. A limited experience however, will establish the utmost confidence in their efficacy and safety, when used in accordance with the teachings of "dosimetry."

Hoping to reassure the timid, the following list of remedies has been prepared, showing the size of the dose as recommended by standard authorities, so-called, and giving the standard alkaloidal granule as well. The numerals given are grains or fractions of a grain, so the "gr." has been omitted. The works referred to are "National Medical Dictionary" by John S. Billings; "Notes on Newer Remedies" by David Cerna; Gould's "Illustrated Dictionary of Medicine" and the standard dosimetric works of Burggræve, Castro and others.

Drug Name.	*Billings.*	*Cerna.*	*Gould.*	*S. G.**
Aconitine, crystalline	1-400 to 1-300			1-500
Aconitine, amorphous			1-200 to 1-50	1-134
Agaricin	1-12 to 1-5	1 to 2	1-20 to 1-16	1-67
Anemonin		1-12 to 2-7		1-67
Apomorphine	1-15 to 1-10			1-67
Arbutin	1-10	75 per day	15 to 30	1-67
Asparagin		1-6	1 to 6	1-67

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*Standard alkaloidal (dosimetric) granules.

Drug Name.	*Billings.*	*Cerna.*	*Gould.*	*S. G.*
Aspidospermine		1-4 to 1-8		1-67
Atropine sulph	1-120 to 1-40		1-120 to 1-60	1-250
Barosmin			2 to 3	1-6
Baptisin	2 to 5			1-12
Berberine sulphate	2 to 5	2 to 5	1 to 10	1-67
Bryonin			1-4 to 2	1-67
Brucine	1-30 to 1-15		1-10 to 1-3	1-134
Caffeine	3 to 5		1 to 5	1-6
Cannabin		1 to 5		1-67
Cannabine tannate		2 to 10	5 to 10	1-67
Caulophyllin			2 to 5	1-6
Chimaphilin			2 to 3	1-6
Cicutine (or Coniine)			1-60 to 1-10	1-134
Coniine hydrobromate		1-50 to 1-30	1-30 to 1-15	1-67
Coniine hydrochlorate	1-6 to 1-2			
Cocaine			1-8 to 2	1-67
Codeine	1 to 2		1-2 to 2	1-6 & 1-67
Codeine sulph.		1½ to 2		1-6 & 1-67
Colchicine		1-120 to 1-20	1-120	1-134
Collinsonin			2 to 4	1-6
Colocynthin	2 to 6		1 to 1¼	1-134
Convallamarin	1-5 to 1	1-2 to 1 or 2	1-4 to 2	1-6
Cornin			2 to 4	1-6
Corydalin			1 to 5	1-6
Cotoin	1-12 to 1-8	1-2 to 2	1-2 to 1	1-67
Cypripedin			1-2 to 3	1-12
Daturine		1-120 to 1-80		1-500
Digitalin	1-50 to 1-12	1-100 to 1-50	1-60 to 1-30	1-67
Dioscorein			1-2 to 4	1-6
Elaterin	1-20			1-67
Emetine (as an emetic)	1-8		1-8 to 1-4	1-67
Emetine (as an expectorant)			1-120 to 1-40	1-67
Ergotin	5 to 10			1-6
Euonymin	2 to 5		1-2 to 3	1-67

Drug Name.	*Billings.*	*Cerna.*	*Gould.*	*S. G.*
Gelseminine	1-300 to 1-200	1-60 to 1-20	1-60 to 1-20	1-250
Gelsemin			1-8 to 1	1-134
Gossypin			1 to 5	1-6
Helenin		1-6 to 1-3		1-67
Helonin			2 to 4	1-6
Hydrastine	1-3	1-4 to 1-2		1-67
Hyoscine	1-130 to 1-65	1-4 to 1-2		1-1000
Hyoscyamine	1-60		1-30 to 1	1-250
Iridin	1 to 5		1 to 5	1-67
Jalapin			3	1-67
Juglandin			2 to 5	1-67
Koussein		15 to 30		1-67
Leptandrin	1-3	1-32	2 to 4	1-6
Lobeline (as an emetic)			1 to 3	1-134
Lobeline (as an expectorant).			1-4 to 1-2	1-134
Macrotin			1-2 to 2	1-6
Menispermin			1 to 4	1-6
Muscarine			1-100	1-250
Napelline		1-6 to 1-2	1-6 to 1-2	1-1000
Narceine	1-3 to 3-4		1-4	1-67
Pelleterine sulphate	5 to 7			1-134
Pelleterine tannate	1 to 5		1-2 to 1	1-134
Physostigmine salycilate	1-80 to 1-20			1-250
Phytolaccin	2 to 3		1 to 3	1-6
Picrotoxin	1-120 to 1-60	1-100 to 1-10	1-60 to 1-20	1-134
Pilocarpine	1-60 to 1-2		1-8 to 1-2	1-67
Piperine	1 to 8	1 to 10	1 to 10	1-6
Podophyllin			1-8 to 1	1-6
Podophyllotoxin		1-1000 to 1-10		1-12
Populin			2 to 4	1-6
Quassin		1-30 to 1-3		1-67
Quinine arseniate	1-6 to 1			1-67&1-6
Sanguinarin nit.		1-12 to 1-8	1-10 to 1-4	1-67
Santonin	2 to 4			1-6

Drug Name.	*Billings.*	*Cerna.*	*Gould.*	*S. G.*
Scutellarin ...	1 to 3	....	1 to 2	1-6
Senecin.......	....	....	1 to 3	1-6
Sparteine sulphate.......	1-25	1-2 to 2	1-25 to 1-5	1-67
Strophanthin.	1-60	1-100 to 1-60	1-60 to 1-20	1-500
Strychnine....	1-60 to 1-10	....	....	1-134
Veratrine.....	1-60 to 1-20	....	....	1-134
Viburnin......	....	....	1 to 3	1-6

In referring to the above table, it must be borne in mind that the standard granule here given does not always represent the dose in which the active principle has been found efficient, but may always be safely taken as minimum dosage, to be repeated with reasonable frequency until the desired effect is produced. These are the sizes that can be obtained of the various granule manufacturers and have been found by careful experiment to be most satisfactory.

When one takes into consideration the great variation in dose recommended by standard authorities like Billings, Cerna and Gould above quoted, it is no wonder that the active principle has fallen into disrepute; and in view of the fact that most of the doses given are beyond the border-line of safety, not to say absolutely toxic, it is no wonder that the active principle is looked upon "with fear and trembling."

Right here I desire to emphasize one thing upon which will depend, in a great measure, your success or failure in the use of the active principle. Always use the product of one manufacturer until you are sure you have found something better.

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[*] A word of explanation regarding the clinical feature of this index will not be amiss. It does not aim to be complete, simply referring to such direct suggestions, in the treatment of various conditions, as have been incidentally mentioned in illustrating the therapeutic scope of the active principles discussed.—Pub.

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